Teaching with Technology in an Agriculture Associate’s Degree Program

Tiffany Amber Drape

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Donna M. Westfall-Rudd

Rick D. Rudd

Peter E. Doolittle

Mido Chang

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ABSTRACT

Students in any educational setting need to learn how to integrate and successfully use technology to be successful in a future career. While no one educational system can teach every skill, faculty can help integrate technology and model skills that students will need later in life. Using Rogers’ Diffusion of Innovations as a model, the researcher examined technology integration and how it affected engagement, motivation, and learning in the classroom setting. The purpose of this study was to investigate the phenomenon of technology integration in an agriculture associate’s degree program and evaluate the program from the faculty and student perspective. Ninety-six students enrolled in an agriculture associate’s degree program served as the case study group. A qualitative approach guided the inquiry of the study and was represented through observations, participant interviews, and video collection using Noldus Observer.

Findings indicated that technology integration was being implemented in a purposeful way and the faculty work together to make decisions regarding what to integrate for the students’ use in their courses. Technology integration decisions were supported by the faculty and program leader. Students viewed the technology as beneficial to their learning while enrolled in the program and as an asset when they graduated. Students reported that they felt as though technology was helping them remain engaged and motivated in the program. Students who participated in the recommend that the faculty use the course
management system more efficiently to streamline content to students and the faculty use more features that the system offers such as chat and discussion boards. Students expressed a belief that these practices would help keep students more engaged during class time and help them locate resources more efficiently. It is recommended that faculty work to offer a blended learning experience in the classroom, with group work or guided practice. Finally, as an alternative to traditional assessment, it is recommended that faculty members in the program encourage students to work with technology outside of class to create videos or podcasts to illustrate what they are learning.
DEDICATION

To family
# TABLE OF CONTENTS

ABSTRACT .......................................................................................................................... ii

DEDICATION ......................................................................................................................... iv

LIST OF TABLES ................................................................................................................. xi

CHAPTER ONE ..................................................................................................................... 1

INTRODUCTION ................................................................................................................... 1

Introduction of the Problem ................................................................................................. 1

Problem Statement ............................................................................................................. 6

Purpose and Research Questions ....................................................................................... 7

Importance of Study ........................................................................................................... 7

Personal Reflexivity ........................................................................................................... 8

Definition of Terms ........................................................................................................... 9

Summary ........................................................................................................................... 10

CHAPTER TWO ................................................................................................................... 12

LITERATURE REVIEW ....................................................................................................... 12

What is technology integration in higher education? ......................................................... 12

History of Technology Integration .................................................................................... 12

What Influences Faculty Decisions to Use Technology? .................................................. 15

Diffusion of Innovation .................................................................................................... 21
CHAPTER FOUR............................................................................................................. 51

FINDINGS....................................................................................................................... 51

Qualitative Interviews, Video Observations, and Document Analysis..................... 51

Program Description .................................................................................................. 51

The Program ................................................................................................................. 52

The Faculty ................................................................................................................... 55

The Students ............................................................................................................... 56

How Do Educators Decide What and How Much Technology to Integrate in their
Programs? ................................................................................................................... 57

Theme: Technology Is Integrated and Diffused to Students Based on the Faculty’s
Program and Course Design Decisions ....................................................................... 58

   Sub-theme: Program ................................................................................................ 58

   Sub-theme: Faculty ................................................................................................. 60

   Sub-theme: Students .............................................................................................. 62

What Influences Faculty Decisions to Integrate Technology? .................................... 65

Theme: Technology Is the “Heart” of the Program ................................................... 65

   Sub-theme: Prior and current technology use ...................................................... 65

   Sub-theme: Technology has an influence on student learning, engagement, and
   attention span ....................................................................................................... 67
Sub-theme: Technology can be limiting for students. ................................. 71

What Influences Faculty Decisions to Integrate Technology? ........................ 72

Theme: The Program Functions Smoothly because of the Relationship Students and
Faculty Have. ............................................................................................................. 72

Sub-theme: Instructors help students learn by meeting their learning style needs to
reinforce information .................................................................................................... 72

Sub-theme: Instructors set expectations for students. ........................................... 74

How Does Technology Integration Influence Student Learning in the Classroom? .... 76

Theme: What Factors Keep Students Engaged and Motivated in the Program? ........ 76

Sub-theme: Students decision to attend the program .............................................. 76

Sub-theme: What keeps students motivated in the program? ............................... 77

Sub-theme: Students think about their future plans and how they will use what they
have learned in the program. ..................................................................................... 80

Summary .................................................................................................................... 81

CHAPTER FIVE ......................................................................................................... 85

CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS ............................. 85

Conclusions and Discussion ..................................................................................... 86

Technology is Integrated and Diffused to Students Based on the Faculty’s Program and
Course Design Decisions. ......................................................................................... 86
Technology Serves as the “Heart” of the Program. ......................................................... 90

Make technology an expectation. .................................................................................. 91

It’s the student’s preference to use technology. ................................................................. 91

Training gives students and faculty the confidence to use technology effectively... 92

The Relationship that the Students and Faculty Have as Part of the Faculty and its
Function in Student Success............................................................................................. 93

Faculty recognizes students’ learning styles. ................................................................. 93

Faculty set expectations of students. ............................................................................. 94

What keeps students engaged and motivated? .............................................................. 95

Applying the content in their future careers. ................................................................. 95

Remaining engaged and motivated.............................................................................. 95

Recommendations.......................................................................................................... 97

Recommendations for Practice....................................................................................... 98

Recommendations for Scholar©..................................................................................... 98

Recommendations for classroom teaching....................................................................... 99

Other recommendations............................................................................................... 101

Recommendations for Further Research........................................................................ 101

Summary.......................................................................................................................... 104

APPENDICES ................................................................................................................ 107
LIST OF TABLES

Table 1. a Priori Propositions .................................................................33
CHAPTER ONE

INTRODUCTION

Introduction of the Problem

Students need to learn how to integrate and successfully use technology to be successful in a future career. These technologies may include word processing, troubleshooting of software and hardware issues, and using a search engine (McEuen, 2001). When faculty requires technology based projects in courses, they may help students develop a foundation of important skills to draw upon in the future. Successful technology integration is something that faculty and leaders must take personal responsibility for in order for understanding and learning to take place among the students they are teaching (Larson, Miller, & Ribble, 2010). Rapid changes in technology integration make this task difficult and force everyone within an educational system to keep pace with the constant changes. Students do not have to possess a working knowledge of all software or hardware, but instead, a foundation that will enable them to move quickly into a new technology-based work environment with emphasis on “on the job” training (Redman & Kotrlik, 2004).

Millennials represent the age group of students enrolling in colleges and universities. Born after 1982, millennials can be described as optimistic, high-achieving, and team-oriented (Howe & Strauss, 2003). Current college aged students are heavy users of the Internet, compared to the general population (Jones, 2002). The use of technology and the Internet is part of a college student’s day-to-day activities and has been integrated into their daily communication habits (2002). Today’s college student checks email at least once a day,
considers the Internet their personal library, and treat technology as a way to express themselves through email and social networking.

Millennials present new challenges to faculty at the university level. Some researchers fear that millennial students may lack interpersonal skills as a result of their heavy reliance on using technology as a way to communicate and interact (Elam, 2007). Millennial students will, “engage in multitasking behaviors, enabled by the use of technology, and exhibit shortened attention spans as a result,” (Elam, 2007, p. 22). These students may lack the necessary skills to be critical thinkers or demonstrate self-reflection as a result of their primary and secondary education and standardized testing.

Diffusion of Innovation provides insight into the factors that may influence an individual to utilize a new technology for instructional purposes (Bennett & Bennett, 2003). Faculty faces pressure to utilize technology in their teaching and learning from administrators seeking to turn their universities into high-tech learning communities. “Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system,” (Rogers, 2003, p. 5). The innovation-decision process is the “process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision,” (Rogers, 2003, p. 20). The process can be influenced by prior conditions, characteristics of the decision making unit, perceived characteristics of the innovation, and communication channels.

Rogers (1995) discussed five attributes that impact the rate of adoption: 1) relative advantage, 2) compatibility, 3) complexity, 4) trialability, and 5) observability. “Relative
advantage is the degree to which an innovation is perceived as being better than the idea it supersedes,” (Rogers, 2003, p. 212). Many change agencies use incentives to increase the rate of adoption. The main function of an incentive is to increase the degree of relative advantage. This suggests a need to focus on the specific pedagogical advantages of the instructional technology over a more conventional teaching tool (Bennett & Bennett, 2003). Most instructional technologies are flexible and can be put to many uses.

The second attribute, compatibility, “is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters” (Rogers, 2003, p.224). A faculty member may feel that the instructional technology is consistent with their values and philosophy of teaching but needs to know how the technology will assist him or her in achieving his or her learning goals. In many circumstances, the introduction of instructional technology faces rejection by the faculty because faculty do not account for the amount of time it takes to learn the new technology, or it changes their teacher-centered classroom into a learner-centered classroom (Bennett & Bennett, 2003). To help facilitate the change from teacher-centered to learner-centered, faculty development must evolve from teaching about a piece of technology to training faculty to use software in the learning environment (Rao, 1999, March).

The third attribute, complexity, “is the degree to which an innovation is perceived as relatively difficult to understand and use,” (Rogers, 2003, p. 242). The rate of adoption is slower with more complex innovations. Instructional technologies can be very intimidating for faculty if they perceive them as more complex and learning how to effectively apply it to enhance teaching and learning can be slower (Lynch, Altschuler, & McClure, 2002). Even if the technology itself
is not perceived as difficult, it may be too time consuming for a faculty to learn. To ensure the
fear of complexity does not become an obstacle, it is important to stress that the content and
outcomes of the training will work with the skills and abilities of the faculty involved (Bennett &
Bennett, 2003).

The fourth, trialability, “is the degree to which an innovation may be experimented with
on a limited basis. New ideas that can be tried on the installment plan are generally adopted more
rapidly than innovations that are not divisible,” (Rogers, 2003, p. 243). The greater the
opportunity to try new things, the easier it is for faculty to evaluate and possibly adopt it.
Trialability can be a challenge for many forms of instructional technology since they require
faculty members to make substantial investments of time and energy to learn the basics of
something new. It is important for faculty to try out new instructional technologies to form their
own opinion of its use in their classrooms (Bennett & Bennett, 2003).

The last attribute, observability, “is the degree to which the results of an innovation are
visible to others,” (Rogers, 2003, p. 244). If the technology has a high rate of observability, it
will be easier for a faculty member to learn about it, form an opinion about its potential benefits
and uses, and then make an informed decision about whether or not to begin adopting it.
Observability indicates how critical it is to provide demonstrations to faculty to help them
become familiar with it, ask questions about it, and see it in use (Bennett & Bennett, 2003).

Skinner and Belmont (1993) state that engagement in educational experiences is subtle
and focuses on cognitive, behavioral, and affective indicators. Engaged students show sustained
behavioral involvement in learning tasks and initiate action when given the opportunity.
Students will exert effort and concentration in the implementation of learning tasks and exhibit
generally positive emotions during ongoing action if they are engaged in their educational program (1993).

Pintrich and De Groot (1990) associated engagement levels with students’ use of cognitive, meta-cognitive and self-regulatory strategies to monitor and guide their learning processes. Student engagement is viewed as motivated behavior apparent from the kinds of cognitive strategies students choose to use and by their willingness to persist with difficult tasks by regulating their own learning behavior (1990). The most common way student engagement is measured is through information reported by students themselves. The National Survey on Student Engagement (NSSE) is one example of a self-reporting survey administered to students at colleges and universities (Zhao & Kuh, 2004).

Motivation can be described by Brophy (1983) as “motivation to learn rather than merely to perform,” (p. 200). Students who are motivated will enjoy the process and take pride in the outcomes of experiences involving knowledge acquisition or the development of new skills. Pintrich and De Groot (1990) outline components to increase motivation and self-regulated learning, “an expectancy component, which includes students’ beliefs about their own ability to perform a task, the value component that includes the student’s goals and beliefs about the importance of a task, and the affective component, which takes into account a student’s emotions in response to a task,” (p. 33). The role that a faculty plays is not to maximize motivation but to optimize it within the student thereby maximizing the learning that students will derive from engaging in academic activities (Brophy, 1983).

Motivation involves energy, direction, and persistence (Ryan & Deci, Jan, 2000). Motivation is valued highly because it produces an outcome and it is important to educators to
figure out how to mobilize their students to act and produce an outcome. Several factors can contribute to students’ motivation to learn new technologies. They can be motivated because they see the value in the activity and will behave from a, “sense of personal commitment to excel or fear of being surveilled,” (p. 69). Higher levels of interest and intrinsic motivation can motivate students. Personal interest can alter how much effort or energy a student will put into a given task. Students are also motivated when they deem the task as high value and feel as though the task is more important to them personally. Setting goals can help motivate and direct students and help students direct their behavior based on the content and the nature of their goals in classroom context (Pintrich, 2003).

**Problem Statement**

As faculty work to integrate technology and continue to feel pressure from their students and the educational systems in to adopt new technologies, there are still questions regarding the influence of instructional technology on student engagement and the association that may exist between technology use in a classroom and student learning. Faculty who are supported through opportunities including training, tutorials, and assistance with the integration of technology into their curriculum have been more successful at this task (Oblinger, 2005). However, little is known regarding how much technology should be infused in a class and where technology use is most appropriate to assist students’ with the curriculum they are learning. If technology may help or hinder education, a closer look at this matter must be taken to help faculty, both seasoned and new, make informed decisions regarding which types of technology are necessary as well as beneficial to support the education of students in a collegiate system. Universities interested in
adopting new technologies may want more data on the effectiveness of their current technology integration strategies.

**Purpose and Research Questions**

The purpose of this research is to examine the phenomenon regarding how much technology should be infused in a class and where technology use is most appropriate to assist students’ with the curriculum they are learning. Universities interested in adopting new technologies may want more data on the effectiveness of their current technology integration standards. Major questions to guide this study include:

1. How do educators decide what and how much technology to integrate in their program?
2. What influences their decision to integrate technology?
3. How does technology integration influence student engagement and motivation?
4. How does technology integration influence student learning in the classroom?

**Importance of Study**

With nearly 14,500,000 students enrolled in colleges and universities across the country, students are transitioning to work or college with access to the Internet and other forms of technology at all times (Jones, 2002). The body of students currently in colleges and universities, known as millennials, were born after 1982, have been exposed to advanced technology and expect the integration of these tools in applications wherever they go (Howe & Strauss, 2003). This group of students views technologies such as text messages, mp3 players, and web browsing as part of everyday life (Oblinger, 2005).

At the same time, educators across all age groups are becoming more comfortable with technology and are choosing to integrate it into their own teaching. As colleges and universities
begin to provide more support, faculty are able to get the support they need to be able to implement tools more effectively to satisfy their students and their own learning objectives (Oblinger, 2005). Students expect their faculty to be technologically savvy and will draw opinions of professors based on their ability to integrate technology into a course (2005).

Engagement can be linked to behaviors that students exhibit. When students are deeply engaged, “they go beyond the requirements of the assignment, they exhibit preferences for challenge and risk-taking, and they make effort to master the knowledge and skills,” (Paris & Paris, 2001, p. 93). This definition supports the idea that students are more likely to learn if they are motivated.

**Personal Reflexivity**

With a background as an agricultural educator, the researcher examined her personal experiences and biases related to the phenomenon of teaching and learning in relation to technology integration. Prior to entering graduate school, the researcher taught middle and high school agriculture for five years. The program where she taught was a traditional teacher-led educational environment with approximately 200 students per school year. The program included several instructional technologies that were utilized in classroom instruction on a regular basis. The technologies included a computer lab, Smart Board, projector, DVD player, and various pieces of equipment in the agriculture laboratory and greenhouse.

The researcher had a strong knowledge base and understanding of agriculture education and technology integration within a middle and high school agriculture setting. She developed her own curriculum, lesson plans, and assessments. The researcher taught two undergraduate level classes and was a teaching assistant for one master’s level class during her graduate
program. She utilized various types of instructional technologies during her teaching including online course management systems, computers, projectors, a DVD recorder, a video camera system, Smart Board, sound system, and social networking sites to share class content. As the researcher for this study, she brings a perspective of the benefits of instructional technology from a high school and university setting.

The researcher’s epistemology is grounded in social constructivism. Learning is heavily influenced by the learners’ social interactions, surroundings, and experiences. Information processing focuses on how people attend to environmental events and encode information to store it in memory and retrieve it as needed (Shuell, 1986). Information processing can be broken into attention, perception, short-term memory or working memory, and long term memory. Sensory memory holds onto the stimuli in sensory registers for a brief amount of time so that perceptual analysis can occur before the information is lost (Bruning, Schraw, Norby, & Ronning, 2004). The combination of social learning and information processing work together for a relationship among cognitive and social structures, helping students acquire and retain new information.

**Definition of Terms**

This section includes definitions of commonly used terms used throughout this thesis. The following definitions are provided from existing literature:

- **Diffusion of Innovation** is the adoption of an innovation which then gains acceptance by members of a certain community (Surry, 1997).
• **Technology integration** is the use of computers, interactive media, satellites, teleconferencing, and other technological means in instruction to support, enhance, inspire, and create learning (Larson et al., 2010; Redman & Kotrlik, 2004).

• **Instructional technology** can be defined as “anything that encompasses all the materials and physical means an instructor uses to implement instruction and facilitate students’ achievement of instructional objectives,” (Doolittle, 2010).

• **Engagement** refers to students who show sustained behavioral involvement in learning tasks and initiate action when given the opportunity. Students will exert effort and concentration in the implementation of learning tasks and exhibit generally positive emotions during ongoing action if they are engaged in their educational program as a way to express themselves through email (Skinner & Belmont, 1993).

• **Motivation** is described by Brophy (1983) as “motivation to learn rather than merely to perform (p. 200). Measures of motivation typically used involve choice of one activity over another, voluntary resumption of an activity interrupted earlier, or voluntary presence with an activity when there is no longer any external pressure to do so,” (p. 201).

• **Millennial learner**, born from 1982 through the present, represents a generational cohort, distinct from their parents of the Baby Boom generation, and their immediate predecessors, Generation X (Howe & Strauss, 2003).

**Summary**

The purpose of this case study was to investigate the phenomenon of technology integration and how educators decide to integrate it into their course as well as how it relates to
student engagement and learning. This section provided a description of the research, problem, purpose, guiding research questions, the researcher’s perspective, and definitions important to this research. The following section will provide a review of the literature relevant to technology integration, what influences a faculty’s decision to use technology, student engagement and attention span, and how technology influences student learning.
CHAPTER TWO

LITERATURE REVIEW

What is technology integration in higher education?

Technology integration can be viewed in numerous ways. For the remainder of this work, I will use the following definition as a guide: Technology integration is the use of computers, interactive media, satellites, teleconferencing, and other technological means in instruction to support, enhance, inspire, and create learning (Larson et al., 2010; Redman & Kotrlik, 2004). In 1995, the Office of Technology Assessment reported that schools had made significant progress in implementing technology and helping faculty use basic technology tools, yet schools were still struggling to integrate it into curriculum (Kotrlik, 2003). Technology can help students meet higher standards of learning and can promote innovative approaches to teaching and learning from faculty who were not offering them before, but many faculty still struggle.

Instructional technology integration began in education in the 1940s. By the 1980s, teachers had VCRs, hypermedia, and the first computers in their classrooms. Instructional technology in education now includes DVDs, computers, and other media that can be employed to implement educational plans.

History of Technology Integration

The field of instructional design and technology encompasses the analysis of learning and performance problems. This can include the design, development, implementation, evaluation, and management of instructional and non-instructional processes and resources intended to improve learning and performance in a variety of settings, particularly educational institutions.
and the workplace (Reiser, 2001). It is a relatively new professional area that has become increasingly popular with the great explosion of technology occurring in this century (Saettler, 1990).

The current definition highlights two practices (a) the use of media for instructional purposes and (b) the use of systematic instructional design procedures (Reiser, 2001).

Educational technology has been considered as a change agent in educational development and design (Saettler, 1990). The term instructional media has been defined as the physical means via which instruction is presented to learners (Saettler, 1990). Instructional films began appearing as early as 1910 (Reiser, 2001). Throughout the next two decades, technological advances in areas such as radio broadcasting, sound recordings, and sound motion pictures led to increased interest in instructional media. With the incorporation of sound with visual instruction the audiovisual movement began. However, the Great Depression put a damper on the progress, slowing down the speed of change. In 1932, the Department of Visual Instruction was organized as a result of a merger between three other existing national professional organizations (Reiser, 2001).

Radio gained a great deal of attention during the 1930s. By this time, many audiovisual enthusiasts were hailing radio as the medium that would revolutionize education. This was not the case, and over the next 20 years, radio had very little impact on instructional practices. World War II brought the instructional media movement to a halt in education but switched the movement’s focus to the military and industry. The military produced more than 400 training films and 600 filmstrips and it was estimated that there were more than four million showings of these training films to U.S. military personnel; however, no formal data collection occurred during World War II. The German Chief of General Staff said that his military thought they had
calculated everything perfectly except for the speed with which America was able to train its people with the mastery of film education. Training films also played an important role in training workers in industries. In 1941, the federal government established the Division of Visual Aids for War Training and from 1941 to 1945; the organization oversaw the production of 457 training films. Other audiovisual materials and equipment were employed during World War II including overhead projectors, which were first produced during the war; slide projectors, and audio equipment, which was used in flight simulations (Reiser, 2001).

The audiovisual equipment used during World War II was viewed as a success and after the war ended several research programs were undertaken by colleges and universities. The studies were designed to identify various features or attributes of audiovisual materials which affected learning. These were the first to identify learning principles that could be used in the design of new audiovisual materials. Most of the media research conducted compared how much students learned after receiving a lesson presented with a particular medium such as film, radio, computer, and television versus a lesson without the medium (Reiser, 2001).

In the 1950s, the onset of television as a medium for instruction helped push the audiovisual movement. Television could be thought of as the medium that used pictures and audio representations to communicate a message (Kozma, 1991). By the mid-1960s much of the interest in using television had subsided and the instructional television projects had lived short lives (Reiser, 2001). By the early 1970s, the terms, “educational technology,” and, “instructional technology,” began to replace, “audiovisual instruction,” to describe the application of media for instructional purposes. As interest moved away from television, the computer began to gain momentum over the next decade. While computer assisted instruction was done by researchers
at IBM in the 1950s, it wasn’t until the 1980s that computers were available to the public for instructional purposes. By January 1983, computers were being used for instructional purposes in more than 40% of all elementary schools and more than 75% of all secondary schools in the U.S. (Reiser, 2001). Microcomputers were inexpensive, compact in size, and could perform many functions (Reiser, 2001). Computers held the advantage of allowing the learner to type text and have the computer transform it to speech. Computers were able to help students transform information into symbolic graphs and allowed the learners to manipulate information to help them form new knowledge (Kozma, 1991).

Since 1995, advances in computer and other digital technology, as well as the Internet, have led to a rapidly increasing interest in and use of media for instructional purposes. Further, there has been a significant increase in availability of technology in schools in the U.S. However, an increased presence does not mean an increased use of technology for instructional purposes. Progress has been made to assist faculty with instructional integration, but true change will only occur with long-term support (D. Rogers, 2000).

**What Influences Faculty Decisions to Use Technology?**

Computers can serve as a valuable and well-functioning instructional tool for schools and classrooms where teachers have convenient access, are adequately prepared, and have some freedom in the curriculum (Ertmer, 2005). Instructional tools can be defined as “anything that encompasses all the materials and physical means an instructor uses to implement instruction and facilitate students’ achievement of instructional objectives” (Doolittle, 2010). While many teachers do not work in places where all of these factors are present, research suggests that this is beginning to change. Along with increased access to computers and other kinds of technology,
there have also been increases in opportunities for K-12 teachers to gain technology skills. More teachers are reporting that they feel, “somewhat well-prepared,” to use technology in their classroom instruction (Ertmer, 2005).

Over the last 10 years, many colleges and universities have actively engaged in helping their faculty integrate technology into their own teaching and learning (Oblinger, 2005). With support from faculty development services on campuses, many more faculty are beginning to engage their students in online activities to help bridge the gap between technology and pedagogy, increase faculty self-efficacy and meet the requests of their students. Faculty need to work and think creatively with their students and their changing mindsets. Today’s students do not view computers as technology, but as an integral part of their day to day life (2005).

Faculty’s comfort level with technology today can be organized into three categories: 1) The National Research Council states, “contemporary skills are the ability to use today’s computer applications, enabling people to apply information technology immediately,” (Oblinger, 2005). 2) Foundational concepts are the basic principles and ideas of computers, networks, and information that underpin the technology. 3) Faculty need to work to bridge the gap in understanding technology and being able to effectively integrate it for themselves and their students through teaching and learning, to help build all three in their students through pedagogy and practice.

Over the past ten years, colleges and universities have engaged in integrating technology in teaching and learning (Oblinger, 2005). Approaches to this have been varied as the institutions’ missions and clarity for their aims for technology integration. Faculty development
for existing and future faculty is a pivotal investment to help students as they graduate and enter the workplace (2005).

Universities, such as Virginia Tech, offer faculty the opportunity to acquire teaching strategies that leverage instructional technologies to support student learning (Oblinger, 2005). The Faculty Development Institute (FDI) is an ongoing system to help inform faculty of the uses of technology in daily practice for faculty and students. The goals of FDI are to provide professional development to faculty through educational workshops, replace faculty computers on a four year cycle, promote digital literacy, and support course development initiatives (2005). As a result, students are more likely to find that a majority of their courses involve blended face-to-face and online learning activities, online discussions, archived learning materials, and discipline specific software. Faculty have responded by attending more FDI workshops and increased their use of technology in the teaching, research, and service roles of their professional lives (2005).

Faculty indicate that they find equal or greater value in systematic assistance from their peers when they attend FDI workshops than from the teaching in the workshop (Oblinger, 2005). Such assistance includes sorting out ways in which new techniques and procedures are possible in their own learning environments and the incorporation of interdisciplinary agendas. Faculty presentations, case studies, and examples of both successful and problematic examples in FDI workshops provide information for participants as well as the opportunity to model and improve existing work (2005). The FDI program encourages faculty to interact with their colleagues in the workshops and after the sessions have ended. Resources and contact information for each program are provided on its web site and are modeled much like an online course. Faculty-to-
faculty questions and online conversations can be extended after workshops through online forums and email with presenters. Production resources for digitizing all workshop content is available through FDI (2005).

Assisting faculty as they integrate technology into instruction is the single most important information technology issue on campus. Effective integration of information technologies is a national priority - one that should be supported by education and training programs that enable educators to implement effective uses of educational technologies (Fabian, 2006). In order for faculty to integrate instructional technology successfully, they need to first consider what their learning objectives are for a course and how any technology based instruction would be relevant or adapt the instructional technology to meet the objectives based on the students’ needs (Okogie, Olinzock, & Okogie-Boulder, 2006). Faculty will have to choose the methods that are relevant to their subjects and be mindful of the technology selected, the learning styles of their students, and the pace of learning they are hoping to achieve. Virginia Tech and FDI have seen that repeated participation of virtually all faculties (96 percent) and collaboration with department heads has helped to build a wider understanding of the complex issues surrounding technology integration in courses across the campus community. The FDI encourages interactions among the faculty and the workshop presenters and offers resources to help support faculty after the workshop is complete. Evaluation of the workshops is done every 90 minutes using a web-based form, providing instant and rapid feedback to presenters to help tailor their presentations to the needs of the faculty participants in the program. The FDI has also worked to create programs for faculty through online activities that mimic what their students view as a learning environment using communications technologies. Workshops might include an online tutorial, a video...
segment, and an online chat or discussion. Technology based resources mixed with the hands-on use of software with instant support provides opportunities for faculty to practice before integration in their own course systems (Oblinger, 2005).

Current literature includes few reports of university wide efforts to integrate technology into classrooms. However, a study conducted at the University of Buffalo (UB) reported that an Educational Technology Center (ETC) was created to support the adoption of a centrally supported course management tool and contribute to the University’s teaching community and its efforts to meet the information technology goals at the University. Data was collected from 1999 to 2003 to assess the ETC through the Faculty Summer Seminars and the Educational Technology Grant Program for faculty. Faculty Summer Seminars began in May 1999 with intensive immersion programs designed to develop baseline skills in a variety of educational technologies that included Web resources, asynchronous access to course materials, and interactive learning opportunities through discussion boards and online self-testing. Seminar presentations included instruction in various educational technology applications, discussion of pedagogical issues, and faculty commitment to teaching and learning. The seminars exposed tech-savvy users who later served as mentors for other interested faculty beyond those in the seminar group. University of Buffalo chose to focus on the needs of an interdisciplinary group of instructors who taught World Civilizations, a large-enrollment course the University required of all students. In 2000 and 2001, department chairs were asked to nominate individuals from their faculty who would benefit most from the seminar and provide the requisite post-seminar modeling to mentor department colleagues. Thirty-five departments participated in the seminars in the two years (Fabian, 2006).
The study reports that in the summer of 2000, there was an overwhelming response of qualified applicants for the seminar and it was therefore split into two sections based on colleges and disciplines. Participants reportedly benefitted from this split as it allowed the planners to tailor a specific seminar to the instructional programs. The ETC reportedly worked with coordinators in the academic divisions to collaborate on successive seminar sessions. The ETC offered content and discussion on non-technological issues such as tenure dossier, intellectual property in the digital environment, and assessment. In the 2000 and 2001 seminar sessions, the in-class and hands-on instruction were supplemented by seminar content delivered by the UB Blackboard course management system. Using technologies to learn technologies allowed attendees to experience the course management system from the students’ perspective, to view asynchronous enhancements, and to gain first-hand experience in manipulating and developing a course using the application (Fabian, 2006).

The seminar program, designed to develop skill sets among users, proved to be successful. Virtually all summer seminar attendees produced and launched a tangible educational technology project within one year. Approximately 75% of seminar participants worked with ETC in following semesters to utilize the support services as a means to improve their practice. The grant projects encouraged a higher level of sophistication, experimentation, and complexity as the program progressed over five years. Grant funded projects went beyond basic technologies to demonstrate innovation and emphasized student-centered strategies (Fabian, 2006).

Integrating technology as an instructional tool may be more of challenging for educators who have not been given time to explore or have not been introduced to a new piece of
technology in a way that would foster their own learning. Educational institutions need to consider multiple methods of diffusion in order to meet the needs of their faculty and staff and ensure integration is successful. Also, it may be helpful if institutions looked more closely at the relationship between a particular technology and the pedagogy used by their faculty before choosing to implement it to help faculty and students get the most benefit from the technology. Supporting technology integration using the diffusion of innovation theory will ultimately benefit everyone involved and add to the learning environment of the institution (Oblinger, 2005).

**Diffusion of Innovation**

Diffusion of innovations is a theory of how, why, and at what rate new ideas and technology spread through cultures (Rogers, 2003). Diffusion is the adoption of an innovation which then gains acceptance by members of a certain community (Surry, 1997). Rogers (2003) outlines that there are four major factors that influence the diffusion process: the innovation itself, how information about the innovation is communicated, time, and the nature of the social system into which the innovation is being introduced. Diffusion relies on how these factors and other factors interact with one another to help or hinder the adoption of a practice or product among a group of people. Rogers (2003) defines communication as a process where participants create and share information with one another to reach a mutual understanding. Diffusion of technology in an academic setting can change the individual faculty and can take as long as five to ten years (Kershaw, 1996).

Rogers breaks the adopters of innovation into five groups based on the time it takes them to adopt: innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003).
Understanding what category a faculty member falls into can help program leaders cater their support needs to best meet a teacher’s needs (Antonacci, 2002). Innovation goes through a period of slow, gradual growth before experiencing a period of dramatic and rapid growth (Surry, 1997). Generally, a smaller percentage of people are innovators and early adopters, while a great number are early and late majority adopters of an innovation (1997).

Diffusion is the process in which an innovation is communicated through certain channels over time to members of a social system (Rogers, 2003). Post-secondary education looks at technology for adoption in various forms (2003). Technology has two components: hardware, or a tool that holds technology and software, the knowledge needed to operate the tool (Rogers, 2003). Faculty must be able to exhibit expertise when working with hardware and software in a class (Antonacci, 2002).

Diffusion of innovation focuses on the reinvention of products and behaviors so they become a better fit for the needs of individuals and groups (Rogers, 2003). Working with faculty to change how they work and view their role in the organization can help them recognize that change is needed. Kershaw (1996) states that developing a plan, creating appropriate organizational structures, providing support and training, and promoting technology for a variety of purposes will help further the diffusion of technology integration.

The social system of an organization has a structure or a pattern of arrangements within the system. In the setting of post-secondary education, the social system can revolve around the school system with administrators, faculty, and students or in a larger setting of a community where an education program is situated. The structure of the social system has a set of norms or established patterns that have been pre-established (Rogers, 2003). Faculty can serve as change
agents, or people who attempt to influence their clients, students, parents, administrators, or other faculty, to adopt an innovation.

Technology transfer is the application of information and is a two way exchange between the distributor of the technology and the party involved in learning the technology (Rogers, 2003). Since many technologies are no longer new, Kershaw (1996) believes that successful technology integration focuses more on managing the change effectively. The reaction of the adopters will affect the length of time it takes to implement a change in technology.

Implementing a new technology requires both parties to learn individually and as an organization (Attewell, 1992). Individual learning takes experiences regarding technology into understandings that can be viewed as personal skills and knowledge. Organizational learning takes each individual’s experiences and collectively organizes them into routines, practices, and beliefs about a technology (Attewell, 1992).

Diffusion of technology integration will depend on the faculty and the rate at which they choose to adopt new hardware and software. When a new technology is introduced, an individual will gather information, test the technology, and then decide if the amount of time and energy is worth the potential benefits of using the new technology (Bennett & Bennett, 2003). Depending on the amount of support, training, and time faculty have, the innovation may be successful in a short amount of time or take as long as ten years to be successfully implemented (Kershaw, 1996). As universities look to implement new technologies into their academic areas, they need to keep in mind that adequate support needs to be available in order for the diffusion to be successful.

**Factors Influencing Faculty Decisions Not to Use Technology**

23
Rogers (2000) outlines three major reasons why faculty don’t feel comfortable integrating technology in educational settings: access to resources which promote the desired behavior, convenience in adapting the desired behavior, and the reward or recognition for following through on the integration. Institutions may have to evaluate the balance of faculty adoption between teaching and research because faculty may not be convinced that using it will improve their students’ learning (Neal, 1998). Institutions need to realize not only that technology is important, but that learning methodologies are equally important (Turoff, 1999). Successful use of technology can no longer be the, “sage on the stage,” and the instructor must become the, “guide on the side,” (Alexander, 1999).

Faculty may struggle with technology integration because they may have not explored the relationship between pedagogy and technology (Okojie et al., 2006). Technology used for teaching and learning needs to be considered as an integrated process and not a separate entities. It involves the inclusion of the technology itself, and the application to teaching and learning. Faculty may struggle from the onset of technology exposure because they simply do not know how to fit it into the instructional methods they are already using and then how to customize it for their own benefit and their students’ learning.

Faculty may struggle to integrate instructional technology because they don’t feel comfortable utilizing it. The innovation of technology was introduced and for a variety of reasons but not adopted by education. Factors such as training, self-efficacy, and barriers can combine in various ways to affect how faculty feel about technology and the integration into the classrooms (Redman & Kotrlik, 2004). Until faculty are comfortable using and accessing
information with technological literacy, there will be no significant change in instructional practices in the classroom (P. Rogers, 2000).

A new group of emerging technologies, Web 2.0, are attracting the attention of practitioners and researchers because of their unique capabilities. Examples of these include wikis, blogs, instant messages, social media sharing, and social networking sites. Web 2.0 technologies bring the opportunity to increase interactivity and participation by enabling collaborative communication, creation, and content sharing (Garrison & Akyol, 2009). Using instructional technology effectively requires that instructors think beyond the traditional teacher-centered model and towards the student-centered model. Instructional workload and responsibilities are an important factor influencing the adoption and use of technology by faculty. Too much emphasis on the technology itself and lack of support for faculty are other obstacles suppressing the effective application of instructional technology. The use of instructional technology in higher education is a necessary ingredient for academic success and future employment (Garrison & Akyol, 2009).

It is important not to become too enamored of technology. The best choice of technology to use emerges through sound instructional ideas and approaches. The relationship between educational ideas and technological capabilities will ensure the successful use of instructional technology in higher education. Mistakes in the adoption of new instructional technology have occurred when educators lose sight of the educational goal. The integration of instruction and technology requires that educators and universities have a framework to guide the successful design and assessment of instructional technology (Garrison & Akyol, 2009).
Support for integrating new technology can come in many forms. Availability of technology for faculty and students, training, time to plan and learn the technology, technical support for troubleshooting, and administrative support can all change the rate of adoption of a technology in the classroom. Faculty may often require more than a one day tutorial at an in-service day and it may take several weeks, months, or years to be able to effectively use technology. How complex an innovation is will also affect the integration time (Rogers, 2003). Complexity deals with the perception of the innovation and how difficult or easy it is to use (2003). If faculty perceive that something will be complex, their attitude and self-efficacy may decrease, decreasing their rate of adoption. Faculty may also not want to feel forced into a new technology. Intense frustration can follow, and also decrease the rate of adoption.

Technology integration and adoption will be a process. Technology changes constantly and it must be viewed as a continuum and not as a process with an end point. Institutions will need to help their faculty integrate technology (Redman & Kotrlik, 2004). Helping faculty through professional development within the profession may be a good start. Professional development can use the help of experts already working within the field of post-secondary education. Faculty who can offer help and support will ultimately help the profession as a whole.

**Student Motivation**

Brophy (1983) conceptualizes student motivation to learn as a general and situation-specific trait. Motivation refers to an enduring disposition to value learning for its own sake, to enjoy the process and take pride in the outcomes of experiences involving knowledge acquisition or skill development. Motivation to learn exists when students engage themselves purposefully
in classroom tasks by trying to master the concepts or skills involved. Brophy defines motivation as:

Motivation to learn rather than merely to perform. Measures of motivation typically used involve choice of one activity over another, voluntary resumption of an activity interrupted earlier, or voluntary presence with an activity when there is no longer any external pressure to do so.

Motivation to learn can be difficult, forcing the faculty to optimize motivation and maximize the learning that students will take away from academic activities (Brophy, 1983). Student motivation may not look pleasurable in a classroom but students may take the lesson seriously and try to get the benefit from it.

Pintrich and De Groot (1990) look at motivation as a value that involves students’ goals for the task and their beliefs about the importance and interest of the task. Pintrich states that the word motivation is derived from the Latin verb, movere, which means to move. Motivational theories attempt to answer questions about what gets individuals moving and toward what activities or tasks (Pintrich, 2003). Ryan and Deci (2000) distinguish between extrinsic motivation, which refers to the performance of an activity in order to attain some separable outcome, and intrinsic motivation, which refers to doing an activity for the inherent satisfaction of the activity itself (Jan, 2000).

Mankin (2004) suggests that the focus is going away from teaching and shifting to learning. Understanding what motivates students may provide faculty with insights into the elements over the learning process of which faculty have some control. Motivation is central to student learning but has always been a challenge for faculty, because students enter the
classroom with diverse backgrounds, interests, experiences, and learning styles. Certain motivational factors, such as enthusiasm and interesting teaching style, are at least partially under faculty control, while others rest solely with the students, or are out of the control of both (2004).

Faculty characteristics are directly related to student motivation (Smith, 1971). Faculties who are energetic and excited about the subject motivate students by spreading enthusiasm and interest. Faculties who motivate are respectful and positive with students, challenge them, make them feel welcome and valued, and state their expectations clearly. Clarity, structure, enthusiasm, interaction, and variety are considered strong teaching principles (1971).

Students consider technology essential to their education and say that their learning is based on motivation but without faculty; their motivation would cease to exist. Technology is good, but it is not a perfect substitute for having a faculty (Oblinger, 2005). This makes the partnership between good teaching and instructional technologies seem like a perfect pair when viewed through the eyes of a student. Faculty needs to be motivated to learn how to use the technology effectively with support from places like FDI.

Student Engagement

Skinner and Belmont (1993) suggest that engagement is more subtle and focuses more on cognitive, behavioral, and affective indicators. Specifically:

Children who are engaged show sustained behavioral involvement in learning activities accompanied by a positive emotional tone. They select tasks at the border of the competencies, initiate action when given the opportunity, and exert intense effort and
concentration in the implementation of learning tasks; they show generally positive emotions during ongoing action, including enthusiasm, optimism, curiosity, and interest.

Kuh and Hu (2001) suggest that using information technology has a strong positive relationship with overall student engagement levels. In a study of the “best wired campuses,” defined as institutions that made large investments in technology, students reported somewhat more frequent contact with faculty and participated more in active learning activities compared with their less wired counterparts (Kuh & Hu, 2001). These results point to a positive link between information technology use and engagement in effective educational practices (Laird, 2005).

Technology might be the vehicle that is used to deliver content and that can help increase engagement in areas such as active and collaborative learning or student-faculty interaction (Kennedy, 2000). If used appropriately, technology is supposed to enhance student learning productivity. It is still unclear if educators should be treating technology as a separate entity from other forms of engagement or as one of the several avenues that promote or enhance other forms of students engagement with sound pedagogical practices (Laird, 2005).

In a quantitative study, Laird and Kuh (2005), sought to determine whether engagement with information technology was its own form of engagement, or information technology was the mechanism through which students engaged as an existing educational practice. The data from the study was drawn from the National Survey of Student Engagement (NSSE) in 2003. The NSSE is an annual survey of college students at four-year institutions that measures students’ participation in educational experiences (NSSE, 2009). The sample for this research included 60,000 students from more than 420 four-year colleges and universities across the
country (Laird, 2005). Students’ responses to technology items suggest that many students use information technology regularly for personal and academic uses and their classroom engagement levels with information technology was strongly associated with active and collaborative learning (2005).

These strong positive relationships between academic use of information technology and engagement in academic challenge, student-faculty interaction, and active and collaborative learning suggest that engagement goes hand-in-hand with student learning and information technology use (Laird, 2005). Learning more about how students are using technology through the qualitative process will be beneficial to the students and the faculty in order to determine what can influence engagement and maintain it in the academic setting. Faculty need to consider if student interaction with technology adds value and how technology can best be integrated to enhance engagement.

Summary

Integrating technology successfully in any educational institution seems to be slowing down sound pedagogy and the students and faculty are suffering. With services like FDI, Virginia Tech has been able to immerse its faculty in technology to get a feel for what a student would experience if they were using the technologies (Oblinger, 2005). Strategies and support, such as this model, help faculty by offering more than one way to ask questions, seek feedback, and build a community to seek support outside of their workshop time. The faculty and the students can get immediate access to tutorials on learning technologies and can spend more face-to-face time on course content instead of course management (2005).
Educators who are resistant to technology integration need to understand and are aware of the student population they are serving. Students entering college have had access to the Internet since they were approximately 11 years old, and it has become something that is considered a normal habit in everyday life (Oblinger, 2005). In order for educators to make a connection with their students and increase motivation, they need to be able to connect to their students’ digital worlds (Larson et al., 2010). Collaborating with colleagues in similar disciplines and finding a network of support may aide in the success of implementation for educators who are wary of technology and it will be imperative to find a shared vision in an educational institution (2010).

Technology integration has begun to create a new kind of pedagogy that is focused on meeting the needs of individual students on a larger scale through delivery methods and instructional tools (Kolderie, 2009). By working with a student’s motivation and engagement through the use of technology, educators will have more time during face-to-face interactions with students to teach, not to troubleshoot technology. Students can have ready access to course content, assignments, and a wealth of information to support or disprove course content ready for the next class meeting time. Technology will never completely replace a faculty; learning is based on motivation and without a faculty, there would be no motivation for students (Oblinger, 2005).

The intention of this study is to determine what cognitive processes a faculty uses when he or she is deciding which technologies to use and how much to incorporate. The goals of the faculty are for using it as an instructional tool and to view the technology from a student viewpoint to gauge if the technology is aiding in the learning or hindering it. By examining the
phenomenon of technology integration, the researcher hopes to gain new insight on how technology engages and motivates students as well as what technology contributes to student learning. By studying both the faculty and the students together, the researcher hopes to learn how technology can be integrated successfully and what faculty can do to help their students continue to learn in a formal classroom setting.
CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

The purpose of this research is to examine the phenomenon regarding how much technology should be infused in a class and where technology use is most appropriate to assist students’ with the curriculum they are learning. Universities interested in adopting new technologies may want more data on the effectiveness of their current technology integration standards. The integration of instructional technology tools into a classroom influences the relationship between the faculty and the students and has the potential to influence the students’ comprehension of the course material. Triangulation of data collection was important to help address the problem of construct validity. Multiple sources of data provides multiple measures of the phenomenon (Yin, 2009).

This was a single case study of an associate’s degree program in a college of agriculture and life sciences in the Eastern United States. Students volunteered to participate in this study throughout the course of a semester and provided feedback through recorded observations and interviews. Six students from the program were in their first year of the program and four students were in the second year of the program. Each participant gave consent to participate in this study. This case did not propose to represent all students in one year of the program, but instead focused on the program as it is conducted within the university. Corbin and Strauss (2008) explain, “qualitative research allows researcher to get at the inner experience of participants, to determine how meanings are formed through and in culture, and to discover rather than test variables,” (p. 12).
To capture the, “lived experience,” of participants and their reactions to engagement with technology, their instructor, and other factors that affect their engagement, the process of interviewing provided opportunities for both formal, structured interactions with the participants, as well as informal conversation (Rossman & Rallis, 2003). Interviews provided rich descriptions of the ways students engage in cognitive processes which could not be done through pure quantitative analysis. Observations, as defined by Rossman and Rallis (2003), included, “formal, structured noting of events, activities, and speech…and participant observation,” (p. 172). These methods allowed the researcher to observe the flow of the classroom and the interaction taking place between the instructor and the students during class time. The researcher was able to observe the relationships that formed between the instructor and the students throughout the course of the semester to determine if these relationships had the potential to influence the students’ engagement levels.

A case study was employed in an effort to understand the in-depth, real-life phenomenon over a period of time with a set audience, to try and gather meaningful data that might not be achieved in one interview or isolated incidence (Yin, 2009). Yin (2009) explains that case studies are used to, “contribute to our knowledge of individual, group, organizational, social, political, and related phenomena,” (p. 4) . An additional strength of case studies, when compared to other research methods, is that a variety of evidence is provided through an array of techniques, like interviews, observations, or document analysis (2009).

The Research Design

An associate’s degree program was selected as an opportunity to closely examine the potential influences on student engagement in classrooms with high levels of technology
integration. The potential influences that were specifically examined in this case included: student engagement levels and attention spans, student feedback about the courses and instructors, and the relationships that formed between students and instructors. Students were purposefully selected to participate based on their enrollment in the two available program courses offered in the spring semester, as well as their year in the program.

**Contacting the Case Study Group**

The population within the associate’s degree program was selected after the researcher met with the program director and learned about the level of technology integration utilized in all of the program courses. Faculty members in the program were selected based on their willingness to participate and their desire to conduct research to gain feedback about their use of technology and teaching from their students.

After receiving Institutional Review Board (10-1084) approval (Appendix A), participants were sought from within the program to volunteer to be videotaped twice a week, during each of their course sections, and to participate in four interviews throughout the semester. Consent forms (Appendix B) were distributed in class and students returned them if they wished to participate. The program leader also agreed to participate (Appendix C) in an interview and provide historical documents for analysis. The two instructors who agreed to participate also signed consent forms to be interviewed and recorded (Appendix D). Cameras were set up before each class to record the class as a whole and web cams were attached to lap top computers to record individual participants who gave consent to participate. Video was collected from the students’ computers once a week and stored for analysis. The instructor
offered the option of extra credit or coffee cards from a local coffee shop for those students who participated.

**Sampling and Participant Selection**

Students were solicited during the first class session and presented with the purpose of the research, consent forms, and given the opportunity to ask questions. The researcher and professors were both in attendance to answer questions. The only criterion for student selection was that they were enrolled as either a full- or part-time student in the associate’s degree program offered in the College of Agriculture and Life Sciences. Only those students who gave consent were recorded. This was accomplished by arranging the cameras to focus on students who gave consent. Students had the opportunity to decline the interview portion if they chose.

**Preliminary Work**

The *a priori* proposition proposed in Table 1 was used by the researcher to plan and develop the interview guide and observation protocol. Yin (2009) explains that propositions can, “reflect an important theoretical issue,” or provide guidance in, “where to look for relevant evidence,” (p. 28). Table 1 explains how the propositions are related to the participant interview guides and classroom observation protocol, as well as the supporting literature.
Table 1

*a Priori Propositions*

<table>
<thead>
<tr>
<th>Proposition</th>
<th>Supporting Literature</th>
<th>Research Question</th>
<th>Interview Questions</th>
<th>Observation Guide</th>
</tr>
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<tbody>
<tr>
<td>Teachers decide to integrate technology based on their personal comfort level and accessibility to technology.</td>
<td>Computers can serve as a valuable and well-functioning instructional tool for school and classrooms where teachers have convenient access, are adequately prepared, and have some freedom in the curriculum (Ertmer, 2005). (Ertmer, 2005). Instructional tools can be defined as, “anything that encompasses all the materials and physical means an instructor uses to implement instruction and facilitate students’</td>
<td>How do teachers decide what and how much technology to integrate and what influences their decision to integrate technology?</td>
<td>Describe your definition of technology.</td>
<td>How does the professor interact with technology?</td>
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<tr>
<td>How do you decide what technologies to integrate when you’re designing your class?</td>
<td>How comfortable are you with the technologies you</td>
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achievement of instructional objectives,” (Doolittle, 2010).

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<th>integrate?</th>
<th>environment?</th>
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<tr>
<td>Who do you ask for help when you’re struggling with the technologies you use in your classes?</td>
<td>When the professor is interacting with students, does he refer to technology?</td>
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</table>

Where do you go to view new technologies you might want to use in your field?
Table 1

*a Priori Propositions, continued*

<table>
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<th>Proposition</th>
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<th>Research Question</th>
<th>Interview Questions</th>
<th>Observation Guide</th>
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<tbody>
<tr>
<td>Integration of instructional technology affects a students’ engagement level in a class and motivation during class time.</td>
<td>Engaged students are more likely to learn, to find experience rewarding, to graduate and pursue higher education (Marks, 2000). Students consider technology essential to their education and say that their learning is based on motivation and without teachers; their motivation would cease to exist. (Oblinger, 2005).</td>
<td>How does technology integration influence student engagement and attention span?</td>
<td>Describe your definition of technology.</td>
<td>What do students do when technology is used during the class?</td>
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<td>How does this professor integrate technology?</td>
<td>What non-verbal or verbal cues do students use when the teacher discusses technology (related to a Scholar site if there is one)?</td>
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<td>Based on the above answer, do you feel as though the technology helps or hinders the delivery of the course content and why?</td>
<td>What do students do when technology is not used during the class?</td>
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<td>Do you find it helpful in learning?</td>
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<tr>
<td>Question</td>
<td>Answer</td>
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<td>course content? Why or why not?</td>
<td>What cues does the professor use to motivate students? (language related to grades, learning, etc.)</td>
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<td>What factors help you stay engaged and motivated in this class?</td>
<td>What kind of response do students exhibit when the professor refers to an upcoming assessment or assignment?</td>
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<td>Whom do you ask when you need help with technology?</td>
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### Table 1

*A Priori Propositions, continued*

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<th>Supporting Literature</th>
<th>Research Question</th>
<th>Interview Questions</th>
<th>Observation Guide</th>
</tr>
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<tbody>
<tr>
<td>Integration of instructional technology will enhance student learning of course curriculum.</td>
<td>In order for faculty to integrate instructional technology</td>
<td>How does technology define learning?</td>
<td>What kinds of questions are students asking in class? (something related to recall of information vs. mastery?)</td>
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<td>need to first consider what their learning objectives are for a course and how any technology based instruction would be relevant or adapt the instructional technology to meet the objectives based on the students’ needs (Okojie et al., 2006). Faculty will have to choose the methods that are relevant to their</td>
<td>How would you student learning in the classroom?</td>
<td>Do you view the technology you integrate as a tool to help your learning and understanding of the material? How?</td>
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<td>What cues are students giving that they are learning? (this question set might change after hearing from Jeffrey about his integration and thoughts on it)</td>
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<td>Why do you think the professor chooses to integrate this technology?</td>
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<td>Are there other technologies or other ways of using this</td>
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<td>Does the professor meet the objectives</td>
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</table>
subjects and be mindful of the technology selected, the learning styles of their students, and the pace of learning they are hoping to achieve.

technology that you think the professor should be using or doing? Why or why not?

What do you think the professors objectives are for this course?
Data Collection

Participant Observations

Observations of the classroom took place over the course of six weeks. This time period allowed the researcher to follow the two classes of students and observe their interactions with each other, their peer group, their professor, and the technology integrated into the course instruction and management. Observations took place each week during the classes and using the recorded video. The researcher kept a journal to record observations during the review of the classroom video and points to follow up on with the instructors and students during interviews.

The observation guide found in Appendix E and Table 1 illustrates the relationship between the literature and observation points of interest. Cameras focused on the instructor, the participants, and of the lab as a whole to gain a better understanding of the classroom environment. Observations were an important portion of the case study as it is not unusual for a participant to say they are doing one thing when they were actually doing something else (Corbin & Strauss, 2008). Observations helped the researcher be consciously aware of what the participants were doing during class but not able to articulate during interviews.

Interviews

An interview guide was used by the interviewer to help the instructor recall and reflect on the curriculum material, the structure of its delivery, and the technology used to deliver the lessons. The interview guide can be found in Appendix F. Faculty and students were asked to participate in interviews at various points during the semester. The director of the program was interviewed in order to allow him to discuss the role of technology in the program and expectations he has of the faculty who taught in this program.
Interviews served to get students’ perspective on a piece of video after it had been reviewed by the researcher. Students were asked questions regarding their behavior or lack of behaviors related to instructor engagement and the students’ engagement during class.

Interviews were somewhat unstructured, meaning there was a general interview guide; however, at times what the participant said triggered another question or led to other areas of discussion. Unstructured interviews helped increase the richness of the data and allow the researcher to ask more questions as the participants divulge information on their view of technology and their instructor (Corbin & Strauss, 2008). All participants were assigned gender neutral pseudonyms and are referred in the masculine throughout this work.

Data Analysis

The director of the program and the participating faculty provided the researcher with access to documents about the history of the academic program and course materials that were distributed to students during the course of data collection and observations. Documents on the history of the program were evaluated for information and to inform the researcher of the expectations of the program for the students and for the faculty. Documents collected from the courses were evaluated for content and how they supported or required the integration of technology into the courses. Faculty provided the researcher access to Scholar©, the course management site, to access these materials and any other features that the faculty have available to the students.

Data Analysis

44
Analysis included observing video, utilizing Noldus Observer© to find themes in the video of participants and the lab instructor, and transcripts of the interviews with the participants and the lab instructor. Triangulation of data collection is important to help address the problem of construct validity. Multiple sources of data provided multiple measures of the phenomenon (Yin, 2009).

Video served as an important dimension in this case study. The video capture process was unobtrusive and allowed the researcher make observations, take notes, and listen to the class (Patton, 2002). Video was analyzed and coded two ways. During the actual class session, the researcher observed the class, making notes in a journal of observations, and general notes on the rapport of the instructor and tone of the class on that particular day. Upon completing the class recording, video was viewed on the student computers to look at particular students’ behaviors or non-behaviors using Noldus Observer© to code video for behaviors based on the questions outlined in the a priori table. Video from student laptops was watched to check for consistency and to compare what each of the students appeared to be doing during the class. While much of the student laptop video was similar in nature, showing the student working on the computer or focusing on the instructor, it was all viewed as a way to add validity to the study. The instructor and the student videos were coded for how many questions were asked during a class session, number of questions answered, the response time between questions, and interaction with technology.

Observation notes helped inform the researcher of the class dynamic on each day recording took place, along with specific references to how the students and instructors were interacting with technology. Notes included a description of the setting or questions that arose as
a result of the interaction that the students or faculty were having with technology. The observation notes were coded with the interviews and used to help form follow-up questions for participant interviews. The observation notes were made through the eyes of the researcher and happened spontaneously throughout the course of data collection (Corbin & Strauss, 2008).

Express Scribe© transcription software and Atlas.ti© coding software was used during the transcription and coding of the interviews with participants and the lab instructor. Observations from the researcher’s journal were also transcribed and stored for further analysis. Memos were created during the transcription process in order to make note of any themes and reactions as they arose. Memos helped the researcher stop and analyze codes early in the research process to help be aware of common themes among the different pieces of data (Charmaz, 2006). Observations and transcripts were analyzed to determine any patterns, frequency of codes, or code combinations that would help develop a rich and full explanation in response to the research questions (Yin, 2009).

Coding took place throughout the data collection process. After interviews were transcribed, the researcher used in vivo coding in Atlas.ti© to first break the data into large codes based on patterns that were emerging using the participants own words. In vivo coding was done to determine what meaningful patterns were emerging to make up sub-categories of data (Charmaz, 2006). The a priori table informed the researcher during the coding process to determine if the questions posed were being answered and to identify the data source that related to them.

After open coding was complete, focused coding occurred. The resulting codes were more direct and began to explain larger segments of the data. Focused coding helped determine
the adequacy of the in vivo codes (Charmaz, 2006). By comparing data to data, focused codes were created to help the researcher begin grouping like codes and refining them into larger groups of categories.

The final step in the coding process was axial coding. Axial coding helped the researcher bring all of the data together and determine themes based on the research questions (Corbin & Strauss, 2008). The researcher accomplished this by using large note cards to write each focused code on one side and relevant quotes on the other side. The note cards were laid out across a large table and then sorted and grouped together based on the research questions. Axial coding helped link the categories and the sub-categories together (Charmaz, 2006). Note cards of similar categories were placed in groups and themes emerged based on the common factors the categories shared. The process of axial coding helped to sort, synthesize, and organize the data to reassemble it in a new way after coding was complete (Creswell, 2007).

**Trustworthiness, Reliability, and Validity**

Triangulation served as the design for this case study because of the opportunity to use multiple sources of evidence (Yin, 2009). Using multiple sources of evidence helped explain the phenomenon and improved the construct validity since multiple sources measure multiple measures (Yin, 2009). Neutrality was exhibited since the researcher has no predisposed notions of how students and the instructor viewed technology, but wanted to probe into these two areas and how they affected student learning (Patton, 2002).

Reliability was enhanced through the use of field notes and high quality recordings of interviews with transcriptions. Transcriptions provided trivial, but sometimes important, pauses and overlaps (Creswell, 2007). The data was coded and analyzed using Atlas ti© software.
Coding helped the researcher put a label on meaningful segments of data with the intent to categorize and help summarize each piece of data. Codes showed how the researcher selected, separated, and sorted through the data to begin an analytic list of codes (Charmaz, 2006). Initial codes were put into theme areas to help take a realistic stance on the transcriptions to determine common themes, codes, and findings (Charmaz, 2006). This helped the researcher detect a process of coding, detect any holes or gaps in the data and organize the data into larger categories.

Member checks were performed to ensure that participants validated their thoughts during interviews. Participants were sent copies of their transcribed interview transcripts to ensure they were fairly represented in their interview. Participants had the option of requesting changes or meeting with the researcher to clarify the transcript. Member checks were also conducted throughout the process by comparing the video recorded in class with the observation notes recorded by the researcher.

The interviews were conducted over a period of time that coincided with observations and video recordings to gauge what happened with the integration of technology and learning between the participants and the instructor. Gathering data over a period of time helped establish truth claims of the qualitative methods (Rossman & Rallis, 2003). Participants were able to elaborate, correct, or discuss their interview transcripts as a way for eliciting further information about the analyses (Rossman & Rallis, 2003). Allowing participants to read through and understand their own transcripts added validity to the research study.

**Researcher Bias and Limitations of the Study**
The researcher’s personal experiences and background influenced the study. As a user of technology throughout her career as an educator and instructor of college level courses, she had her own bias and opinions on technology integration in a university classroom setting, but not in this specific setting with this population of students or faculty. She tried to remain neutral during data collection and interviews in order to ask probing questions and be open minded to the students and faculty in the program.

Limitations in this study were inevitable, as with all research. While every attempt was made to collect documents and gather extensive field notes from observations and video recordings, the strength in the study lies in the data from the participant interviews. Although the participants were all familiar with the study, their range of experience with technology was diverse. The researcher relied on their self-reported behaviors as they related to their use of technology and how they felt it was being integrated into their educational program. This study did not include the perspective of students who had graduated and their views on how technology impacted them after graduation, and did not encompass the full scope of technology integration.

**Insider/Outsider Considerations**

It is important to note that the researcher benefitted from maintaining both insider and outside statuses (Yin, 2009). Insider status results in the firsthand knowledge the researcher gained from experience in the realms of technology integration and education. As an insider, the researcher was an educator of an undergraduate course and had an understanding of students in the college of agriculture and life sciences. However, the researcher had never studied this
program on an intimate level, taking into consideration engagement from both the students and the instructor. Therefore, as an outsider, the researcher was able to enter this research and make observations specifically related to those things as they arose. A journal was utilized at all times to help her gauge her reactions to: watching the videos, conducting interviews with the participants and instructor, and analyzing the videos in order to help the researcher create an awareness of possible bias towards the research.

**Summary**

This chapter described the rationale for the qualitative research design of the case study and the methodology for investigating engagement on both the student and instructors in an oral communications class. Three methods for data collection were selected including recorded observations, interviews with the participants and instructor, and video analysis with the use of facial recognition software. This chapter explained the rationale for sampling, the process of analyzing the data, reliability of the findings, researcher bias, and limitations of the study.
CHAPTER FOUR

FINDINGS

Qualitative Interviews, Video Observations, and Document Analysis

The purpose of this research is to examine the phenomenon regarding how much technology should be infused in a class and where technology use is most appropriate to assist students’ with the curriculum they are learning. Universities interested in adopting new technologies may want more data on the effectiveness of their current technology integration standards. Using recorded video, in-class observations, and interviews with the instructors and students, the researcher examined how the instructors integrated technology and how the technology influenced student engagement, motivation, and learning. The study connected data derived from qualitative interviews, video observations using Noldus Observer©, and analysis of documents provided by the program. An Associate’s Degree Program in a College of Agriculture and Life Sciences at a large land grant institution in the Eastern region of the United States was used as the site for the study. Students enrolled in the program served as the participants.

Three major questions guided the case study:

1. How do educators decide what and how much technology to integrate in their course?
2. What influences their decision to integrate technology?
3. How does technology integration influence student engagement and motivation?
4. How does technology integration influence student learning in the classroom?

Program Description

51
The Program

The Associate’s Degree program at the land grant institution in a College of Agriculture Life Sciences aims to tie student coursework directly to career goals through specialized courses that focus on the student’s career plans in the agriculture industry. The objective of the program is to provide practical training for high school graduates who are interested in farming or working in agribusiness, but who do not necessarily wish to pursue a four-year agriculture degree (Burcham, 2011). The mission of the program is, “…to recruit and prepare top quality Associate Degree graduates to fulfill the technical and management level needs in a rapidly changing and diverse agricultural industry (Burcham, 2011). By combining classroom instruction and hands-on laboratory instruction at the university farms and experiment stations, Virginia agriculture is the emphasis of the curriculum. The program supports subject areas including, marketing and business management, agricultural mechanization, mathematics, communication skills, rural community leadership, computer applications, and economics (Burcham, 2011).

The idea for the program was born in 1982; however, it took almost five years to obtain the necessary documentation and complete the legal procedures involved in creating a new program at the university. In 1982, there was no program in the state offering this type of degree program, forcing students from this state to attend other colleges and universities for an Associate’s Degree Program in agriculture production. The state’s General Assembly responded to the Report of the Agriculture Opportunities Commission, passed Senate Joint Resolution 20 mandating that the University, in cooperation with the other land grant institution in the state, submit to the Senate Council of Higher Education, a plan for higher education for agriculture and, specifically to address the possibility of a two-year program. These land grant institutions,
and several community college locations around the state, were pinpointed as potential locations for the program. This land grant institution was selected because of the existing farms, livestock, machinery, equipment, and supporting instructional faculty in all the areas of agriculture. In 1987, the program opened with the first group of students and since then, more than 870 students have graduated with associate’s degrees.

Each year, the program welcomes approximately 60 students into the freshman class. Students choose one of two areas to study: applied agriculture management or landscape and turf management. Within the applied agriculture management area of study, students gain a balanced education that includes courses in animal production, business, and crop production to prepare them for diverse job opportunities.

Students are encouraged to specialize in a concentration area that allows them to pursue entrepreneurial opportunities, agribusiness management, crop production, or management of equine, cattle, poultry, sheep, or swine operations. Business courses provide instruction in financial record keeping, agricultural law, professional selling, personnel management, strategic marketing, whole business planning, and information systems, all focusing on strategic management and economic issues of the agricultural industry.

Laboratories stress the use of modern management methods and computer applications for problem solving. The animal science curriculum includes courses in genetics, nutrition, reproduction, health, management, business, mechanics, and forage production. The focus is on the biological and economic aspects of animal production and management. Crop science courses include soils and soil fertility, tillage, integrated pest management, fruit and vegetable
production, and other cropping practices. Courses concentrate on the production and use of field and forage crops, including their biology and management.

Students in the landscape and turf management concentration learn: golf course management, landscape management, sports turf management, and horticulture production. Students prepare for a career in the green industry, including landscape design, golf course management, horticulture production and nursery management, and sports turf management. They learn about turf grass and landscape installation, maintenance, and management. Courses focus on landscape design, site preparation, construction and maintenance, and turf grass species selection, installation, and management. Additional course work includes important topics such as integrated pest management, business practices, computer applications, horticulture production, and agricultural chemicals and their application (Burcham, 2011).

Along with coursework, students are required to complete an internship to satisfy degree requirements. Internships offer students the opportunity to learn about the occupation of their choice through work experience, develop a more mature attitude toward their academic and professional preparation, and encounter situations that are not available in a classroom experience.

In 1991, the program underwent a review by members of the College of Agriculture and Life Sciences. The review found that the program had done a good job of offering a relevant curriculum with appropriate options and had generated support from the agricultural industry and related businesses. Graduates were ready to begin employment upon completion of the program. The review committee noted that the entrance requirements to the Agriculture Technology Program were low and did not compare to the four-year baccalaureate
requirements. However, even with low entrance requirements in place, the program still appeared to be under-enrolled.

At the request of the Dean of the College of Agriculture and Life Sciences at the university, another task force was organized in 2005 to evaluate the program. The task force concluded that the program is an important part of the overall academic program offered by the College of Agriculture and Life Sciences and it was imperative that efforts be made such that the program becomes an accepted part of the college’s mission. The task force identified major goals to assure the program acceptance become a reality. Goals included: increasing the GPA from 2.0 to 2.5, reviewing and revising admissions requirements, implementing a systematic recruitment plan, examining alternatives to the curricular options currently offered, emphasizing professional development for both instructors and students, exploring sources of funds to support special program initiatives, and improving the image and acceptance of the program within the greater land grand university.

The Faculty

The environment of both classes was very informal and social in nature. Students were encouraged to interact with each other and the instructor before and after class began. In the senior level class, the environment involved more dialogue between the students and instructor, Emerson (pseudonyms are used for all participants). Emerson encouraged students to ask questions by asking them questions to increase understanding and feedback from students. Using the Noldus Observer© software analysis, Emerson was observed asking approximately two questions per minute during his class sessions. Questions were asked to determine if
students understood the material and how they understood its application to their own future employment setting.

Jessie was the instructor in the freshman level class. As a result of the enrollment level - 60 students - and the limited classroom space, the classroom layout was not conducive to a great deal of faculty movement. Jessie felt bothered by the restrictive layout and inability to walk among the students while he taught. Jessie explained, “You can’t get up and down the aisles just because of book bags and what not in it. I suppose if I really wanted to roam and make it a priority I could tell them to put the book bags…” Jessie worked to get to know his students by asking questions before class began, discussing current events or sports, and telling humorous stories. Students appeared to be engaged during this time, nodding, making direct eye contact with him, and not looking at their own computer screens. Jessie also asked a high number of questions during class, with the aid of Power Point as the main delivery tool for material. Jessie implemented the i>clicker® in his course, and during class he incorporated several questions to utilize them with his students.

In both classes the instructors set forth expectations for their students. Both groups of students were expected to have: completed previous homework and other assigned tasks before they came to class, downloaded or printed any materials for class on that given day, and managed their coursework using the Scholar© course management system. Students were expected to participate in class and bring previous experiences with them to draw on for discussion as the instructors set context for the material for future use.

The Students
Students enrolled in the program were predominately male and Caucasian, based on in-class observations during data collection. Fifty-nine students were enrolled in the Applied Agriculture Management major and fifty-five students were enrolled in the Landscape and Turf management major. Students are required to purchase a laptop computer for use while they are enrolled in the program.

Beyond coursework, the program requires students to complete an occupational internship to provide practical experience in the agriculture industry. The internship must be a minimum of 10 weeks long and can be completed at any time during the program. It is recommended that students complete this internship during the summer between their first and second year of attendance. Students enrolled in the program were career oriented and three of the four participants in their second year of the program were planning to enter the workforce upon graduation.

Students worked closely with their advisor to keep abreast of their academic progress and requirements, communicate their goals, and inform their advisor of their future plans so they could plan together. If students wished to continue their education after graduation, they were eligible to continue at the university through an articulation agreement. Credits transferred to the individual department where the student transferred. The only stipulation behind the articulation agreement was that any student who enrolled in the Associate’s Degree Program had to complete it successfully before being admitted to a four year program.

How Do Educators Decide What and How Much Technology to Integrate in their Programs?
Theme: Technology Is Integrated and Diffused to Students Based on the Faculty’s Program and Course Design Decisions

Sub-theme: Program. Technology use and integration is an expectation of the faculty when they are hired as well as of the students when they accept admission into the program. The program director, Quinn, said, “This program is one of the programs that really loves technology. The instructors are really comfortable with it and they have good skills applying technology.” Through monthly faculty meetings and informal conversations with each other, faculty members are expected to know how to use and implement technology on a daily basis.

This framework begins upon being hired to teach in the program, and the direction comes from Quinn’s faculty meetings, which provide an outlet where feedback and open communication are welcome. Suggestions for new technology or review of a current piece of technology can be discussed and faculty work together to make decisions regarding the program. Quinn tries to support the faculty decisions to add new technology tools with funds and professional time for training, if it’s needed. The faculty members work to try not to, “overload the students applying the technology.”

The program director works with the faculty to assess their needs on technology, whether the request is a new piece of software, additional training, or financial support to help offset the costs associated with integrating technology into the program. A faculty member, Jessie, suggested that the i>clicker® could be a valuable tool for implementation. Quinn offered to support the faculty member if he invited a representative in from the company to provide training to the faculty. Training was administered to the faculty in the fall of 2010 and Jessie began
integrating the i>clicker® with his students in the spring of 2011 as a pilot, to see if other faculty members in the program wanted to implement them in future semesters.

Faculty are encouraged to seek help for integrating new technology resources from the university’s Faculty Development Institute (FDI) to enhance their skill set and learn about new resources. To help save money, Quinn requires that each member of the faculty work through the Faculty Development Institute to earn a free computer by attending a series of professional development workshops. Each instructor completes training every three years to keep an updated computer to use. Quinn encourages his entire faculty to use FDI and also attend workshops they facilitate as part of their own professional growth. Quinn cites FDI as a major contributor to the success of the program, partnering with them to obtain grants and test out new software. Quinn explains his rationale for using FDI as a main resource for the program:

If it is expensive, I will find other resources, go to FDI see if there’s budget there and a small grant that I can apply for. It means use the resources you have on your own and after that see what others have, but it’s important to begin with a consensus among the faculty that yes, it’s important, let’s go for it. This is how we start.

The university moved from Blackboard© to Scholar© for the start of the 2010-2011 academic years and the program was making the transition smoothly. Faculty was urged, by Quinn, to attend FDI workshops, and he set the expectation that they would attend one or two workshops before their annual evaluations. Quinn worked to accommodate his faculty, organizing training times for the faculty. Practical training sessions were offered once a month with the faculty as a group after Quinn completed all of the FDI courses so he could facilitate them and help faculty make the transition from Blackboard© to Scholar©. Quinn recognized
that if the faculty were comfortable and acclimated to Scholar®, teaching the students to use it and be comfortable would be less of a challenge. Faculty would be able to manage their courses, answer student questions, and troubleshoot their own Scholar® sites.

**Sub-theme: Faculty.** Jessie joined the faculty part-time in 2000 and became full time faculty in 2005. When he began teaching in the program, there was not a technology or computer requirement. Since then, the technology requirement was set and Jessie has noticed that students have a greater comfort level with the technology when they arrive as freshman to the program. Jessie identified himself as an early adopter of technology:

I’m probably more the early adopter kind of person than the other ones in the group, so if it works here and they have to have it, I’m sure somebody else will be trying it in their classes and I’ll expand it to a couple of classes in mine, once I figure out, sort of get a handle on this…just try it and go, try and make it go, it seems like a really neat idea we can do a lot of things with it, let’s give it a shot. I’m probably more inclined to that than other ones in the program.

Jessie views technology integration as something that makes his life easier, whether it’s his teaching or application in the agriculture industry. He considers multiple sources before choosing a technology, including professional development conferences, speaking with colleagues, and FDI. Jessie said that word of mouth is sometimes his most powerful indicator if he, “hears people say things often and read about something coming in.” He will usually use an Internet search engine first to find out more information about a resource, and then continue to ask questions through contact with a company, conversations with Quinn, and finally the faculty of the program.
Jessie continues to adopt and adjust to technology in his classroom. With the introduction of the i>clicker® in the Spring of 2011, he worked to make adjustments to his material and incorporate opportunities for students to give feedback on their content knowledge so he can assess areas they may need review in or more information on. Jessie was first exposed to the i>clicker® from FDI and attended training sessions where other faculty from biology and chemistry were integrating them. Jessie presented the idea to the rest of the faculty and received support to begin using them. Jessie recognized that using Power Point© did not allow for much movement within a large classroom that was at capacity for students, and wanted to incorporate something else as a way to gain students’ attention and engage them in the material.

Emerson joined the faculty in 2007 and, prior to returning to his role as an instructor, had run his own business, which he still operates. While running his own business, Emerson cited his use of Microsoft Word© and Excel© as the main sources of technology on a computer. There was an adjustment period after he began working for the program and he felt behind to start. Over time, he said he felt more acclimated, comfortable, and willing to do something different with technology. Through his teaching and feedback from students, Emerson admitted that he has moved away from traditional Power Point© slides for student distribution and has moved to other means to deliver content.

In most of my classes I’ll utilize things like study questions, review questions, study guides, example problems, class notes as word documents. If I have a power point it’s probably something that’s probably about three years old now because I haven’t done a new one in a while, and I haven’t looked back with any regret on that. So that’s been one
big shift for me, saying, ‘wait a minute,’ if I’m presenting information, I don’t have to use this format and I’m probably better off using something like that.

Emerson does not view himself as an early adopter of technology. He defines himself as, “practical,” and, “apprehensive,” when discussing his technology use and adoption. Emerson views technology from a utilization standpoint and wants to know he is using it for practical purposes. He explains:

Yes, I'm very practically minded, so I don't think technology is useful I don't do it just for the whiz bang of it; I don't do it just because it might look cool or might have some sort of appearance. It has to have a practical utilization for me to do that; how I use it is what can I do to transmit the information I have to the students.

Emerson recognizes that not all of his students love technology. He understands that students need to be familiar with computers and other technologies before they graduate from the program, so he works to introduce them to email, Microsoft Excel© spreadsheets, and skills in online etiquette, such as sending a professional email. Emerson feels comfortable with the other faculty, and meetings are open for faculty to discuss what they would like to start or stop doing in terms of teaching, curriculum, and technology. Emerson said, “Quinn takes the lead on that (technology) to a certain extent and Jessie has been innovative on the i>clicker®.” He is not opposed to using technology if he can find it to be useful to his students and help fulfill a need for them.

Sub-theme: Students. Student feedback helps shape decision-making within the program. Feedback from the students serves as valuable tool and faculty garner feedback as a question on a test, through informal conversation, or from feedback forms of the course at the end of each
semester. Current students in the program feel comfortable with the faculty and consider their positive relationships with them due, in part, to the technology that they are asked to use. Faculty considers the technology a key in the student’s success after they graduate and enter the workforce or continue their education. Students who enter the program come with the mindset that they are in the program to complete it, be successful, and enter the workforce.

Kris understands why the program asks him to integrate technology, “because they know that right now in our society technology is taking over and they want us to be ready for the future. To possibly start my own business or start working for a business and we know how to do things correctly so that way we don't get in trouble with our taxes or anything like that.” Quinn notes that only about ten percent of the graduates decide to enter the four year program at the university or transfer to another university to seek continuing education for a bachelor’s degree. Students who enter this program are looking to return to a family business or enter an agriculture-related field upon graduation.

Teaching students how to think independently and problem-solve issues related to technology begins during the first days students are on campus. Students spend the first day of classes immersed in learning how to function at the university and begin using the laptop computers they were asked to purchase. Quinn teaches all freshmen in a computer applications class and the first full day of classes is dedicated to this course. The entire faculty is on hand as Quinn leads the new students in accessing university accounts, using the course management system, downloading and installing programs, and teaching students how to begin troubleshooting their own problems. Students can always ask Quinn or any of the faculty questions during their time attending the program, but Quinn is trying to emphasize the
importance of being able to solve technology problems for life after graduation. Quinn explains his rationale for structuring the first day of class:

I’m at the point where I feel that the students will be responsible when they purchase their computers. They need to be able to maintain their computers and know how to handle it if they have problems. I think we are delegating the responsibilities to them because this is what is going to happen after two years in the program. There’s not a faculty available to fix their computer. They have to know, if they have issues, how to fix them. We are delegating to the students to take responsibility for fixing their computers.

Students say that this is a helpful way to begin the program. Jamie considered the training helpful because he did not have a computer background before coming to college and had relied on his parents to help him, “If it didn’t plug into the wall, it was broken. Coming here made me more independent and made me think, ‘oh, I can do this.’”

Students consider Quinn to be an expert on technology and nearly all of the participants cited him as the expert that they turned to first if they were having trouble with their computers. Some attributed this to the fact that Quinn taught their introductory computer applications course, while others considered his helpful nature and willingness to take time with them individually reasons they considered him an expert. Rory said he would go to Quinn because he was willing to help anybody, and he liked the one-on-one help he received. Students found the entire faculty to be helpful and available for them if they needed it, saying they could ask, “pretty much anyone,” and, “if one (faculty) wasn’t available, another is.”

Graduates of the program are also contacted for their feedback on how their use of technology in the program is being applied in the workforce. Quinn tries to get feedback from
graduates every three or four years and in 2010, graduates were contacted to see if they were using all of the functions of the tablet computers the program asked them to purchase. Quinn said, “I was concerned, with the economic situation, that the tablet PC prices were higher than a regular laptop.” Graduates responded to a survey about their tablet computers and Quinn found that, while graduates liked them during their studies in the program, they were expensive and not being utilized to their full capacity following graduation. Quinn and the faculty made the decision to no longer require tablet computers and moved to the same laptop requirement that the rest of the university had set for the incoming students in the fall of 2010. This saved the students approximately $500 when they purchased a computer.

Second year students, who began in the fall of 2009, had mixed feelings on their tablet computers. Ashton said, “I love being able to have the tablet because I could do assignments with my pen; it was convenient. I’m kind of glad that the program made us buy it because that way I had to get it and now I have a nice computer that I can have forever. I think it was a good investment and I’ve gotten my money’s worth out of it.” Taylor felt that the tablet computer “got more in the way because of the electronic part with the electronic writing.” He felt it was easier to write things on paper.

What Influences Faculty Decisions to Integrate Technology?

Theme: Technology Is the “Heart” of the Program.

Sub-theme: Prior and current technology use. Students enrolled in the program had a wide array of prior technology use that they drew on when they first began. Students took classes online, some had exposure to Power Point© and Smart Boards©, and some had floppy disks with no computer interaction at school. Kris explained, “We had Power Point© and Smart
Boards© in the classroom and computers in the computer lab. We did some stuff with different irrigation and watering systems.” Taylor laughed and said, “Floppy disks, not advanced very far.”

On any given day, students might use Scholar to view an assignment or upload a homework, view a power point using a projector, answer a question using their i>clicker®, Skype™ a friend to work on a group project, access a financial management tool, research irrigation and drainage methods used in a foreign country, and video conference with another university to learn about agriculture to complete coursework for the program.

Students found the transition seamless after taking a computer applications course offered by Quinn as part of the program. Taylor said, “That has been a fairly easy transition and I feel in command of the things in Scholar© that I need on a day to day basis.” Quinn’s class also helped students transition by showing students how to use programs such as Quick Books©, a financial management software that students will use throughout the two years in the program. Further, Quinn utilized video conferences with people from other countries and universities so students could get a global feel for agriculture. Other instructors use videos to demonstrate procedures in the greenhouse and follow up with questions on assessments. Kris liked all of the technology he was exposed to, “technology is used a lot and you can use it in lots of different ways; however it fits best for you.”

With the heavy use of Scholar© as the course management system, students enjoyed having a clearinghouse for all course materials, the calendar function to help them organize themselves and the content, and the accessibility of the instructors using email if they have questions. Parker said he liked being able to take notes on the Power Point© presentation and go
back to look at what the teacher said and what notes he added during class. It helped reinforce what the teacher said and served as a good way to study. Ashton found the technology served as a convenience for his study strategies, “The teacher puts the chapters on the Internet and then we can read them rather than using the book…. I can follow along on my computer and jot down my own personal notes.”

Technology influences the relationship that the students have with the faculty both positively and negatively. Jamie likes that he can use Skype™ if he needs help with a class, “If I have a problem with anything, I can always Skype™ a friend; you can Skype™ with professors if, for some reason, you have a problem.” Carson liked email and found it to be useful when he could not find Jessie to ask him a question about class before he left for spring break, “Over break, you could just email them and they usually responded to you pretty soon, so that was helpful with keeping in touch with them.” Taylor described how technology affected the relationships he had with the faculty:

You have a different relationship because you’re doing it all over the interwebs. You can get your work over Scholar™, your homework can be posted, you can contact them by email, and it can all be submitted electronically, homework and stuff. You don’t have that coming in and seeing them personally all the time, so that makes it easier if you’re at your place your apartment, you can just email them and they’ll email you back. I don’t have to truck across campus or figure out when I’m going to do that.

Sub-theme: Technology has an influence on student learning, engagement, and attention span. Participants highlighted several reasons why technology was helping them learn more efficiently in and out of the classroom. Reece liked that he could save it to his computer and go
back and reference it when he had more time, or find a specific page more easily by typing in a search phrase instead of trying to remember a page number. Kris liked being able to model what Emerson demonstrated in class, “It gives me the confidence to say that he’s doing it, so I can do it, and it kind of clicks. It’s a repetition thing and I don’t feel like I’m in the dark.” During observations, students in both classes would be seen following along with the instructor on their own computer screens and making notes on the screen with their tablet pen or typing them in the document. Sydney felt as though his laptop was a unique tool:

I would view it as a tool and the reason for that is how it has the ability to digest and go back through it. You can ask questions and go back to the slides and everything like that and it’s just pretty easy to understand what you said if that’s the point and doesn’t give you fill or anything like that. He doesn’t give you paragraph; he just gives you a 6 x 6 bullet: six words, six lines, straight to the point, so I like it.

Taylor understood that technology would be a key tool for his future, “The technology helps with presentations and understanding documents so you can make very professional and formal documents once you get into the real world.” Taylor added that these kinds of skills are what he felt set him apart when he interviewed and was offered a position in the field of his choice after he graduated.

Rory liked the i>clicker® because he felt as though it kept him engaged in class, “It’s kind of fun to have it.” He felt as though it made learning more fun and he thought of class more as a Jeopardy game to help him get more familiar with the material. Carson felt as though the i>clicker® made him pay more attention to class, and Parker said the i>clicker® was a personal test for him, “You only have a certain amount of time to do it, so if you’re not paying attention,
you don’t have time to flip through your notes so it makes you pay attention.” Jessie used the i>clicker® as a way to assess students and their understanding of the material.

I like that I can get some feedback, who has got this, who’s not…. They put up the answers and I need to see where everybody is and get feedback. They got it or they didn’t get it. I need to do more of that. Cover a topic, give a few questions on it, do they have it, do they not have it, let me go back and cover it, as opposed to figuring out on the test that a bunch of people don’t have it.

Parker felt as though Jessie chose to integrate the i>clicker® to help keep his attention on the students. Parker said, “If it was just him up there writing on a blackboard for a whole hour of class, we wouldn’t have anything to do with our hands.” Not all students shared Parker’s enthusiasm for the i>clicker®. Kris said all he could do with it was answer questions and felt as though it was a waste of money, “for a little square with A, B, C, D.”

Participants were looking for more guidance with the use of Scholar© and its functions as the course management system the program used. Sydney felt as though it could be more user-friendly and, with the amount of information some instructors uploaded, he got lost, “There’s just too many boxes that pop up. The only thing you need is the tabs and the calendar to automatically come up.” Taylor felt as though Scholar© sites for his classes were overpopulated, “Jessie had stuff on there from three years ago and it had all this useless stuff, so it was really confusing.” Taylor felt as though Scholar© was dependent on the instructor and how organized they were with their sites and how they were communicated to the students. Jamie felt as though the instructors still didn’t know a lot about Scholar© since the program just started using it for the 2010-2011 academic year, “A lot of their thing is trial and error.”
Kris and Jamie liked the chat function in Scholar© and found it to be useful for a class where the instructor was absent:

We have class online via Scholar© via the chat and he posts the power point during the week sometime and then we chat about it in the chat room and it works well. We all like it. We’re still getting graded and getting credits and it’s helpful. We’re learning things.

Kasey said he liked Scholar© because the instructors posted all of the homework assignments and used the calendar to, “remind me when I have homework to do.”

Technology contributed to students’ study strategies as they prepared for a test or worked on a project. Parker used the notes he had written or typed in class and aligned them with the power points. Jamie would take his computer to work with him:

I often go to work right after class so I take my schoolwork to work, there’s no wireless internet so I don’t have any distractions or anything, I have a big test coming up and I took 100 page pdf and an hour and a half before my shift. I sat in the parking lot and highlighted all of the key points of this pdf and that worked out. I didn’t have any distractions.

As helpful as technology is to student learning, the participants also knew how distracting it could be to their learning. Students had a hard time controlling time spent on the Internet during class looking at things that were not course related. Popular distracters were Facebook©, online gaming, peer computer screens, and other technology devices such as cell phones. Sydney tried to only check his school email and the calendar for class to see when assignments were due and felt as though it helped his train of thought to stay focused on class. Ashton rationalized his distractions:
I do get on Facebook© and mail and different things. I look up different things in Google.

Today we talked about Australia. I looked at the web address so, I mean, I do get off topic, but I can also be on Facebook© and thinking and listening to him. A lot of the times I'm on Facebook© because we’re going to homework and I know I did it right or I know I can look at the Internet also jumped on the answers and know what's going on.

When students had to study, they cited many strategies such as turning off their cell phones, separating themselves from their peers, and trying to find a place that didn’t have an Internet connection. Reece said that when he wanted to study he went to a location on campus by himself. He liked the fact that no one else was there that he would recognize and he could put his cell phone on silent to alleviate any distractions.

**Sub-theme: Technology can be limiting for students.** While students largely understood and adopted technology in the program, they also found other limitations. Participants felt as though the faculty used the technology as a crutch at times, overpopulating Scholar© sites, trying to cover too much information between tests in large Power Points©, and reverting to the online source if there wasn’t enough time during class or lab to cover the material. Kris said, “Sometimes I think we run out of time so the teacher says okay it's on your PowerPoint©, we learned about it, so we can physically do it.” Kris emphasized that doing something and learning about it on a slide presentation were two different things. Sydney felt overwhelmed and overloaded by technology, particularly when it came to preparing for tests:

When it comes time for exams and it comes time for tests and the information was totally over my head. If you have one Power Point© with 72 slides on it and have a total of
seven to look over, that’s over 350 slides, it’s pretty fast to try and remember that stuff, it didn’t work out.

Students were frustrated by projectors in classrooms that would not work or were not compatible with all computers, saying it caused frustration on the part of both the faculty and the students and hindered the learning process while the instructor worked to get all of the technology working. Instructors were cooperative if Scholar© wasn’t working and would often delay due dates if the site wasn’t functioning properly.

Students also recognized that such heavy technology integration could be troublesome for them as they entered the workforce. Taylor said:

Yes, the limitations are maybe going out in the field and you stick with one thing in college, the use of the tablet, and maybe not be able to use that out in the field and you would maybe have to switch over to a notebook or something to write stuff down. Having your handwritten stuff, and trying to figure out with your stuff that's on the computer also. Organization could be a problem there.

**What Influences Faculty Decisions to Integrate Technology?**

**Theme: The Program Functions Smoothly because of the Relationship Students and Faculty Have.**

**Sub-theme: Instructors help students learn by meeting their learning style needs to reinforce information.** Since joining the faculty, Emerson has noticed an, “incrementally greater savvy or comfort level with computers,” in students entering the program each fall. He says students have a certain level of familiarity with, or disdain for, computers, but has not seen more knowledge in software as a group, and the differences are more individual from student-to-
student. Some students are comfortable with the technology but still prefer to write notes, particularly math equations and problems in business courses. Emerson teaches those courses in the program and works to help students learn more effectively by offering paper copies of assignments on a limited basis when assignments are given that require math. He explained why he tried to accommodate students by using a mix of paper and technology:

They tend to like the handouts and I go step-by-step. It looks like a lot of homework assignments, but I get generally positive notes and reviews or compliments on the class notes or how well was organized for the general layout of things. I think kids today find Power Point© to be a bit passé.

Taylor liked being able to use both his computer and a pen and paper for learning in class. He said that trying to write out examples or diagrams could not be typed, but he also liked that his computer would help store information so he did not have papers everywhere at his house.

Emerson is sympathetic to students and explains that his personal preference in learning affects the way he presents information to his students:

I think it goes back to how well and how readily people adopt technology and I’m sure you probably know more about that than I do, but I think it’s just a personality difference, and do it succinctly. Some people prefer looking at a screen, some people prefer typing on a screen, and some people much prefer to have a piece of paper in front of them. I’m pretty sympathetic to that and I’ve probably used more paper than other instructors because I’m that way. I kind of like having a place to write notes down or a place to write things down rather than typing or clicking or something like that. I also find that with my class, because I’ve got a set amount of math, the things that I handed out was where I got
to where we were working out math problems, depreciation and interest and things and adding things together and whatnot. I much prefer to do that with a piece of paper than I do with a computer.

**Sub-theme: Instructors set expectations for students.** Emerson expects a certain level of professionalism from all of his students. Whether it’s a face-to-face interaction or an email, he expects it to happen at all times and, “there will be consequences if it doesn’t happen.” Emerson wants all his students to have a computer in class so they can access documents on Scholar© or another source and stay on task. He struggled as an educator to try and mix technology with professionalism and wanted his students to understand the difference between, “day-to-day communication,” and professional communication:

I'm looking at my students to learn that there is a higher level of professionalism. I don't feel like there's enough of that out there in the world and that's where you can separate your separate yourself, and also fall behind if you don't have the same for communications… It's where technology is very, very harmful or potentially very harmful for students, because of what I call ’text creep,’ which is texting creeping into other writings, and where what I'm seeing is an e-mail from a student that I regard as being extremely unprofessional…Don't send me that. If you send me that I will respond to it. If you don't hear back from me, that means you need to send me another e-mail that is more professional. I will sometimes send an e-mail back to them the first time and say I can't possibly be expected to respond to this e-mail, you have to send me e-mail I can actually read. I can see some ways in which technology has brought us along, doing
great things for us, and I can see ways in which the changes that we’re doing or going about what technology are harmful or detrimental to student learning.

Jessie works with the other faculty to help students succeed. During faculty meetings, there will be discussion if students are not meeting the expectations set by the faculty or the program. Faculty will work with students through advising meetings to try and gauge where the students need more assistance and have been faced with homesickness, roommate issues, and other personal challenges that seep into the classroom. Jessie tries to ask lots of questions of his students to keep the conversation going and keep his students engaged. Jesse said, “I guess trying to get them engaged in there, to try and maybe ask questions, wait. If I’m not getting something, try and rephrase the question.”

Students have responded to the expectations that the entire faculty set and say that it has helped their relationship with their instructors. Rory liked that Jessie engaged him in conversation during class, not just a lecture, “I enjoy his classes because of the way he talks. He kind of makes it fun and throws in a joke here or there.” Rory added:

His strengths are that he’s motivated and that definitely shows during class time. As far as him talking and stuff, but he gives a lot of good information, he’s full of information, seems like it’s endless to the point of too much sometimes to take in, but other than that he’s organized. He’s a good person, he’s a tough teacher but he expects a lot out of us. Jamie enjoyed that Emerson would share what he was doing in his own business as a way to relate it to what Jamie would be doing in the future, and that Emerson could explain content in more than one way so everyone in the class could understand it.
The positive relationships that the faculty and program built with the students proved to be one of the key components of the success of the students, their learning, and their integration of technology. Throughout the interviews, students referred back to their interactions with the faculty and their peers as an integral function of the program. Students enjoyed that the program director, Quinn, was also faculty and that they took classes with the entire faculty more than once during their two years in the program. They felt it helped with their learning, since they could get to know their instructors’ teaching style, expectations, and continue the positive relationship that they had with them initially.

**How Does Technology Integration Influence Student Learning in the Classroom?**

**Theme: What Factors Keep Students Engaged and Motivated in the Program?**

**Sub-theme: Students decision to attend the program.** Students cited numerous reasons as to why they were attracted to attend the program. Some said that the reputation of the program and university are what drew them to apply during their senior year of high school. Other students looked objectively at what their own goals were for the future and what programs aligned with those goals. Students applied to multiple programs and were forced to make a decision as to the career direction they wanted to head in. Carson applied to culinary school and three other colleges and was accepted to all of them. He explained his decision to come into the program:

The more I was thinking about it, the more I realized that I wasn't going to be able to have my cake and eat it too, because I tried to find a school with both agriculture and culinary and it didn't quite work out. I would've had to live in the city and it wasn't the life I wanted to live.
Other students had the dream of attending the university and through recruitment visits and other students’ experience with the program. They were encouraged to apply by family, friends, and high school teachers. Kris had a very supportive high school teacher who saw potential in him that he could not see at the time. His teacher forced him to not only consider it but to also apply:

My teacher set me down at his office one day and told me that I really needed to rethink this and I was smart and I love agriculture and I needed to pursue it. He basically printed off my application for the program and said this is what we are doing. We're sitting down, we're filling out this application, and we're going to see if you get accepted. I was pushed into it, but I definitely needed it because now I've done so much more than I ever thought I would.

Kris cited his involvement and long standing relationship with his teacher as one of the major factors in his success in the program. Through external involvement in student organizations, Kris obtained an internship in the western region of the U.S. and said the combination of the program and the student organizations were the keys to his success.

Students saw the program as a way to learn how to manage a business instead of memorizing facts and figures, and felt as though the traditional four-year program would not suit their needs. Students viewed learning as, “more than memorizing,” and, “a way to improve one’s self,” and felt as though the program could help them through the hands-on activities and practical application the classes and labs provided. They viewed the technology integration as, “part of the learning process,” and another way to, “create,” knowledge for future application.

Sub-theme: What keeps students motivated in the program? While students cited grades as a major motivator in the short term, they also explained that there were many other factors that
motivated them in the program besides a grade at the end of the semester. Taylor had people pushing him from his home and future employer. Sydney was involved with a club that required a certain GPA to participate, so he felt the pressure to continue to do well in order to keep participating. He also felt a sense of pride in being accepted and doing well in the program, “a lot of people, it’s their dream, and it was mine too when I was growing up. I don’t want to let anybody down.” Carson’s motivation was simple, “I came to school for a reason. I came here to get the job done. I’m supposed to be here.”

The monetary value of the program also added to the motivation of the participants. Reece viewed the program as a, “cheaper,” alternative than entering the four year university. Kris understood that his investment was part of the contract he set for himself and took more ownership for his education because, “I’m paying for this and I need to get it done.” Ashton needed more encouragement to attend the program after looking at the costs that would be associated with it. His brother was able to help him work through the decision making process:

I was actually nervous about coming because, you know, I was trying to decide whether it was a good investment or not and my brother told me no matter what I don't care what you major in as long as you have that university on your résumé and some kind of degree you got. He said I went to culinary school and am $80,000 in debt and it was the best investment of my life. It's a lot of money and I have a lot of loans but it's great, I learn from him. It's only two years, you can only benefit and help you, so I decided to go. So I heard about the program through my career tech school and decided to go when I said I could still go to college.
The faculty teaching and working alongside with the students was another major motivator for the students. Students enjoyed seeing their instructors every day, taking multiple courses with them through the course of the program, and getting to know them on a professional and personal level. The instructors were careful to set boundaries to solidify authority and set clear expectations while remaining friendly. Emerson describes his view on setting boundaries using technology:

It wants to change relationships to take out hierarchy and I’m not comfortable with that because while I like to be on good terms with all my students and I like for them to have a good regard for me, I want them to understand that we’re not friends. We can be friendly but we’re not friends.

Students responded to the boundaries that were set by the faculty saying that they respected the knowledge base and industry experience the instructors brought and tried to be respectful of their time and personal lives. Rory appreciated the fact that the instructors were firm with him and his classmates, “he’s tough and he calls it like it is.” Ashton appreciated Emerson for more than his ability to use technology in the classroom:

He is such a great professor and the fact that he tells interesting stories and what he taught me was a good professor will give commercials. What that is, he will be teaching a lesson to us and then say, ‘10 years ago my wife did this…’ and you'll try to listen because it might sound like an interesting story, and then that kind of wakes you up in your chair and you focus again.

Students praised their faculty and their teaching style and felt they used humor and real life examples and offered more than one way to learn material for future application.
Students identified they were learning by being able to apply what they were learning to situations outside of the classroom. Parker learned about soil compaction in Jessie’s class and was able to apply it in a non-class related situation later:

He told us that, when you see puddles of water on the ground, that’s where the soil has been compacted, and you kind of take that lightly and whatever. A couple of weeks later it was raining outside and we’re walking to get lunch and I was like, aw, that’s where soil compaction occurred. I don’t know, it’s like if you can relate things to real life situations, that’s when you know you’re learning.

Kris said he felt as though those learning moments were happening frequently, “It’s like a light bulb goes off, boing.” Jamie viewed his learning when he could inform someone else of a fact that he had previously learned, and Rory said he felt like it just clicked with him at certain points during class.

Sub-theme: Students think about their future plans and how they will use what they have learned in the program. The future was a common theme found in observations and through the interview process. All students said they knew this program would help them in their future, whether it was joining the workforce or continuing with post-secondary education. Kris said that he hoped to do really well on his internship in the short-term and “really excel and get a lot more contacts and ideas” for his future. Taylor’s short term goals were to graduate with a decent GPA and do a good job. His long-term goals included working for a top 100 public or private golf course, and he felt as though he was on track for that goal in the future. Rory wanted to serve as an ambassador for the program and university, with the goal to graduate and serve as a great role model for others who were thinking about their futures. He also viewed his diploma from the
program as, “a staple mate for your business, you know, it just makes you stand out amongst the rest because the program is great.”

When asked how they would apply the information they learned in the future, Kris was confident that, “they know that in society, technology is taking over and they want us to be ready for the future.” With the integration of technology, he said, the program had set him up to start his own business or start working for a business with the confidence that he could do things correctly. Sydney felt the program was educating him so he could effectively be integrated into the workforce through hands-on activities at a fast pace. Taylor viewed the program as a springboard to his future job and felt as though a communications course and interview preparation would come in handy for him. He said the program would help him:

…informing me of what goes on and how to do it correctly for the field. It gives you the book knowledge, then you get out there and do it on in the field, and a lot of employers are really happy that you’ve gotten that and going to the program.

As a faculty, Jessie felt as though it was his job to guide his students for two years until they entered the, “real world,” and started working with the technology in the workplace. Students may have been, “dragged into the technological world kicking and screaming,” but had the guided practice to be successful. Jamie thought he would be able to view his business more objectively, “knowing when to quit, when you’ve gone too far and knowing when to keep going because you haven’t got the most out of it yet.”

Summary

This chapter provided the findings from the qualitative analysis of classroom observations, participant interviews, document analysis, and video observations. Four themes
emerged from the data, which addressed each of the research questions that guided the study. For the first research question, “How do educators decide what and how much technology to integrate in their course? What influences their decision to integrate technology?” The faculty looked for continual feedback from students, to the industry where their students would be employed after graduation, and the cost effectiveness of technology integration in their program. The program director, Quinn, set expectations of his faculty and the faculty set expectations for the students to integrate technology in order to improve communication skills, advance their skill set in their chosen field, and help them gain an advantage over other job candidates in the same field.

The faculty took it upon themselves to stay current with education and the industry, attending conferences, participating in technology workshops, and asking for help when they needed it. Students responded positively to this by adopting new technology and understanding that their faculty members had the industry experience that they would need to obtain a job. Students chose the program based on their future goals and the reputation of the program to deliver a high quality education with technology integrated throughout to gain a competitive edge in the future.

In regard to the second research question, “How does technology integration influence student engagement and motivation,” students said that so much technology can be very helpful and distracting at the same time. Participants had to exercise a great deal of discipline to stay on task during class and said the Internet was the most distracting element of the course. One participant suggested that the Internet be blocked during class time with the exception of Scholar© to reduce his temptation to, “surf.” Overall, students felt as though all of the
technology helped them stay engaged through the use of the i>clicker®, having documents and assignments at their fingertips through Scholar®, and the ability to utilize the functions of the tablet PC to write, highlight, and bookmark documents to review later.

Students found the transition from high school to the program seamless, no matter how much or how little technology they were exposed to prior to entering the program. Participants were comfortable with their technology after completing a required course with Quinn as an introduction to the program, with full immersion to learn how to use their technology on the first day of the program as an incoming freshman. Students stayed motivated by viewing the program as a necessary step for their future after graduation.

Participants wanted to enter the workforce in their preferred industry of interest or continue their education at a four year university. Their motivation remained constant and they cited a variety of motivators that included: their own goals, the monetary value of their education, the reputation of the university and the program, and their desire to better themselves for their future. The program worked hard to keep students motivated by keeping them engaged using multiple pieces of technology each day, setting high expectations as young professionals, and offering opportunities for internships as a way to gain more insight on the industry.

The third research question was, “How does technology integration influence student learning in the classroom?” Participants could identify when they knew they were learning because they could teach someone else the information or be able to identify their classroom learning in a real-life context. Using technology helped them stay organized so they could focus in class. Technology helped students facilitate the relationship they had with the faculty by giving them the ability to ask questions and get feedback when they needed it. Technology
helped them use tools such as Skype™ to ask questions, Scholar© to chat with faculty who were not available, and use the i>clicker® to help keep their attention during class and test their knowledge simultaneously.
CHAPTER FIVE
CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS

The purpose of this case study was to investigate the phenomenon of technology integration in a post-secondary educational setting and how the faculty of the academic program made technology decisions, adopted new technology, and how it affected student learning, engagement, and motivation. College-aged students enrolled in an Associate’s Degree program served as the case study group. Over the course of the case study, participants engaged in the use of a variety of learning technologies to aide in their learning. While some participants had more prior experience than others, for many, this program provided full immersion, from both the faculty and student perspective, in using technology on a daily basis.

Triangulation of connected data derived from classroom observations, coded data from Noldus Observer©, qualitative interviews, and document analysis. Three research questions guided the case study:

1. How do educators decide what and how much technology to integrate in their program? What influences their decision to integrate technology?
2. How does technology integration influence student engagement and motivation?
3. How does technology integration influence student learning in the classroom?

Through a thematic analysis of the data, four themes emerged. The themes provide an insight into how technology integration occurs, how faculty make decisions about technology and its use, and how technology affects student learning, engagement, and motivation. The themes are:

1. Technology is integrated and diffused to students based on the faculty’s program and course design decisions.
2. Technology serves as the, “heart,” of the program.

3. The relationship that the students and faculty have as part of the faculty and its function in student success.

4. What keeps students engaged and motivated in the program?

While the data was collected separately and analyzed concurrently, the various pieces supported each other. The following sections of this chapter present the conclusions, discussion of the findings of the study holistically, and suggest recommendations for future practice and research.

Conclusions and Discussion

Technology is Integrated and Diffused to Students Based on the Faculty’s Program and Course Design Decisions.

As the program has evolved since its first class in 1987, the leadership has helped guide the program through changes in program offerings, courses, and the use of technology. Universities are making sizable investments in technology to improve learning in order to make students ready for the world of work; however, faculty are either simply not using the technology or not using it effectively (Kershaw, 1996). This program has been successful at adapting to meet the needs that students and the agriculture industry requirements for future employment. As reported in other studies, the faculty have managed the change effectively to be successful in integrating technology (1996). The agriculture industry looks to the program to hire new graduates with the knowledge that they will be well prepared to work in that field.

The program administrator spends time training faculty to be comfortable with the technology, supporting them with funds, and helping them complete trainings through the Faculty Development Institute (FDI). FDI represents this institution’s attempt to focus on the
knowledge and skills development required by faculty in order to meet today’s students’ needs for fluency in using information technology (Oblinger, 2005). The program administrator ensures that faculty understands that technology use will be an expectation when they are hired and is clear in conveying his desire to integrate technology and its necessity to help students learn it before they graduate. By integrating their pedagogical, content, and technological knowledge into their curriculum, the program has evolved into a relationship between the technology and the content. The two have continually evolved and been driven by newer content-related ideas or by new technologies. Students see this as an asset to have and even if they are not heavy technology users in their day-to-day responsibilities after graduation, they still see it as a lifelong skill.

The program leader should be more explicit with potential faculty and students when meeting with them in communicating the high expectations for technology use. While the program leader allows faculty to choose which technologies are important, some of them, such as Scholar© are used on a daily basis and are a necessity to the program. Potential faculty need to be made aware of the reliance on email, the course management system, and other technological means of delivering content to students. Students who are recruited to the program also need to know that they will be required to use their laptop extensively, but will also receive support from the faculty to help them feel more comfortable.

Quinn and Jessie, educators in the program, identified themselves as early adopters. Individual Innovativeness theory suggests that individuals who are predisposed to being innovative will adopt an innovation earlier than those who are less predisposed (Rogers, 2003). Innovators are risk takers and pioneers, and will increase the threshold for adoption so others will
feel comfortable. Rogers (2003) states that an individual is more likely to adopt an innovation if more of the other individuals in his or her personal network have adopted it previously, and this was the case for Emerson. As other faculty found sound reasoning for using a certain technology, he followed suit and was able to adopt it with guidance and a sound rationale for why he was being asked to use new instructional technology. The faculty may identify with Quinn and Jessie as early adopters or Emerson as a late adopter of technology. Faculty knows they will be supported and guided to be able to learn how to use technology whether they are an early or late adopter. A new faculty does not have to be an early adopter, but should come with the skill set to problem solve technology and be open to learning about how technology can enhance their teaching. The faculty who participated felt as though they were supported throughout the technology adoption process and were given ample time and financial support to be exposed to new technology, learn how to use and integrate it, and implement it with students. Faculty was also provided open communication to discuss technology and provide feedback to help make informed decisions on continuing to use it as an enhancement to their teaching.

The faculty is willing to try any piece of technology, software, or take the advice of the agriculture industry to expose students to something new before they enter the workforce. The program administrator said he worked closely with the industry and communicated with past graduates on their feelings about technology integration and how it had been helpful for their ability to obtain and keep a job post-graduation. The faculty works to diffuse instructional technology by addressing the multitude of factors that influence the adoption of innovations to better explain, predict, and account for the factors that will impede or facilitate the diffusion of technology to the students (Surry, 1997).
The program administrator used a new landscape design program as an example, and was currently funding the landscape instructor to become certified to use a piece of landscaping software and purchase the software needed to train and certify students. Eventually the landscape instructor will certify any student in the landscape management program to receive an additional accreditation while they are enrolled as a student. The program will be tested for two years and be evaluated based on the student’s ability to improve their landscaping skills set and employability. At the end of the two year trial, the faculty and program administrator will make a joint decision to decide whether or not to continue allocating funds to the accreditation. If the program is not successful, funding will be stopped. The program administrator is not afraid to start or stop a program if there is consensus from all of the stakeholders. The priority of the program is the student and how it will be beneficial for future employment. This is an example of how the program can help students be successful after graduation because of the technology integration they are being provided as part of their curriculum. The faculty and program administrator worked to make this certification program available to the students by providing financial resources and time to learn to use the software. The faculty member was beginning to diffuse the software to students in their classes and offer the certification as a way to make graduate more marketable in the landscape job market.

Students receive training on how to use and incorporate technology from the first day they enter the program. They are required to purchase a laptop computer, install their own programs, and learn how to use them through guided practice and modeling from the entire faculty in the program. While the program administrator is viewed as the expert, the entire faculty is regarded as knowledgeable and available if students need more help. Students
capitalize on this interaction both within and outside of the classroom, taking advantage of online chats through Scholar®, using Skype™ to chat with friends about questions on assignments, and using the calendar feature in Scholar to help them stay organized for their classes. Paired with class and lab time, this serves as a modern depiction of the environment this generation of students prefers to learn in (Oblinger, 2005).

Students found it helpful to take multiple classes from the same faculty member. Students would often have a faculty member during their first semester and then more than one time for a class in their content area during their two years in the program. This helped them learn what the faculty member expected in terms of academic work, what kind of technology they preferred to use, and helped build rapport between the students and faculty. Students enjoyed the variety of technology they could use, depending on which faculty member they were taking class with, and were able to get comfortable with their teaching styles.

By making informed decisions and putting the students first, the program has successfully created a culture centered on technology. This blended approach of face-to-face and online learning activities, online discussions, archived learning materials, and program specific software are all aspects of learning that students claim to appreciate (Oblinger, 2005) In formal and informal conversation, in social settings, and in teaching, the faculty refer to technology on a regular basis and the students integrate it without hesitation. By offering extensive training to faculty and students, the diffusion of technology can be seen as a seamless part of the program.

Decision making for the program is done as a whole faculty, involving the students’ interests, the agriculture industries’ feedback, and the value to the student versus the cost to implement it.

Technology Serves as the “Heart” of the Program.
Make technology an expectation. The program administrator makes technology a priority and works with the entire faculty to integrate it successfully. This leadership style trickles down to the students and they know that heavy technology use is an expectation. While some students say there are aspects of the technology they do not like, overall, they see the heavy use of technology as beneficial and understand why they are being asked to integrate it.

The faculty has worked to learn new technologies, such as Scholar©, but continue using teaching methods that work for their students to maximize their learning, even if that means not using technology. With heavy technology use as an expectation, the program administrator continues to make professional development opportunities available to the faculty through FDI, outside industries, and conferences, by supporting faculty financially to attend and broaden their skill sets to bring back to the classroom.

By staying current with the agriculture industry and technology trends it takes to work within the industry, the faculty communicates the information and trains students during the course of the program. The blending of instruction and job training helps make the technology integration the center of the program, which is important, since many agriculture industries are relying more and more on technology to operate.

It’s the student’s preference to use technology. Through feedback in student interviews, review of the video’s using Noldus Observer©, and observations notes from class sessions, students prefer to use technology. In every class observed, students were using technology and taking in information from the instructor. Laptop computers were open at student desks, projectors were being used to show information, and Scholar© was open to download new assignments and course material. While students admitted that the technology was also very
distracting, they had learned how to self-regulate to get their work completed. Students appreciated having instant access to information provided by the instructor and having the ability to look up anything that was unfamiliar while still remaining engaged in class. Using technology as another outlet for learning can also help students who may not speak up during face-to-face interaction have a presence as they may be more inclined to interact and participate online (Oblinger, 2005)

Training gives students and faculty the confidence to use technology effectively. No matter what the technology background of the faculty and students are, they all said that they felt comfortable using technology. When asked to give feedback on the technology, some said they felt as though there were no problems or had, “small,” or, “minor,” feedback that was, “nit-picky.” The total immersion from the first day of the program gave the students confidence in using their technology, and many felt confident that if something happened, they could troubleshoot it before asking for help from a peer or faculty in the program. By strengthening the students’ belief that they could perform the work using technology, their motivation and self-efficacy have increased.

While the two faculty members who participated in the study were different in terms of their personal feelings on technology, they both saw the benefits of using it and had been able to adapt their curriculum to incorporate technology that would help communicate information to the students as well as use other technologies that would benefit the students in the future. Their focus is not what they need to know in order to appropriately incorporate technology into their teaching, but instead, how the technology is used to be effective in meeting the needs of the students (Harris, Mishra, & Koehler, 2009). While it may not have been a hiring requirement to
have a great deal of prior knowledge about technology, the faculty has been flexible and has adapted to a heavy technology usage model that the program administrator expects. Being adaptable has also helped the students learn about new ways to conduct business in their chosen field. The faculty has been willing to adapt with changes in technology to teach students about new innovations in their chosen area of interest.

**The Relationship that the Students and Faculty Have as Part of the Faculty and its Function in Student Success**

Faculty recognizes students’ learning styles. No two students who participated in the interviews had the same answer when asked how they liked to learn new material. With this in mind, the faculty recognized that students’ learning modalities were all different and used a variety of strategies throughout a single class to try and meet the needs of all learners. With the aid of technology, faculty could offer materials via Scholar®, give students time to work on examples using their laptops or paper, and then give real time feedback using the i>clicker®. Students want diversity in how their content is delivered to them and crave interaction with their fellow students, whether it is in class or online. Faculty need to be active participants and facilitators so their students will not get bored with the subject (Oblinger, 2005). Faculty were not afraid to provide modified material for students if they needed to and extend deadlines if Scholar® wasn’t working or individual students were having technology troubles. The two-way relationship that the faculty and students shared helped facilitate communication via email, on a chat session, or face-to-face.

Students recognized how hard the faculty was working to help them learn and said they respected their faculty because of their work ethic and ability to teach any student that walked
into that classroom. They appreciated the creativity of Jessie and Emerson when delivering course content and need to be given the opportunity to explore and research the content to move beyond being a participant in the class to become an active learner and discoverer (2005).

Faculty set expectations of students. Faculty expected a high-level of professionalism and maturity from students enrolled in the program. An unprofessional email would be returned to the student who sent it if it was not phrased in a professional tone. Faculty was described as, “tough,” and, “telling it like it is,” but, “caring,” and, “knowledgeable,” in their content areas. The faculty expected students to not only learn how to use their technology, but use it professionally and retain skills for the workplace. The faculty set clear boundaries early on regarding their own personal or family time and expectations about assignment policies. Faculty provided their contact information and outlined what they deemed to be appropriate correspondence. By opening up multiple lines of communication, the faculty felt that the students would also be open to communication coming from the faculty.

Students responded to the expectations and thought of the program as a job where they had to learn everything they possibly could in two years, and not a place to, “have fun.” All of the participants had a clear direction set for themselves upon completion of the program and they understood why the faculty members pushed them to be young professionals, and worked hard to not only please their instructors, but to learn the skills they would need in the future. One participant viewed the program as a two-year opportunity to learn everything he could, because he knew that when he graduated he would not have the resources available to him that he had in the program. Students also wanted to model their own businesses after the models they had been exposed to in the program. Students were respectful of the faculty’s personal time and
appreciated being able to contact them if an emergency arose, but did not misuse their personal information. Students did not expect immediate responses to emails or phone calls and acknowledged that they appreciated quick responses during vacations or on weekends.

**What keeps students engaged and motivated?**

Applying the content in their future careers. Students all had clear goals and felt as though the program was a step in the right direction. None of the participants were unsure of where they were headed after completing the program. Second-year participants already had jobs lined up early on in their final semester and had external motivators, such as future employers, encouraging them to learn as much as possible from the program before they began employment. Students said some of the content was, “dry,” or, “boring,” but knew that they would find it useful in the future. As the faculty continually tie content to future application, students were able to remain engaged and motivated in the program. Student motivation could be attributed to the belief that they could perform the tasks that the faculty were asking them to and that it would be a valuable learning experience (Pintrich & DeGroot, 1990). The faculty expected students to enter the program with their own agricultural-related experiences to use as examples for class participation, and encouraged them to, “think for themselves,” when they graduated.

Remaining engaged and motivated. Students focused on their future goals and were able to remain engaged during class by following notes that were published on Scholar®, listening to the instructor, and writing notes on the Scholar® notes using the pen feature on the tablet PC. Participants said it was sometimes hard to remain engaged during class. The Internet was very distracting, and socializing with friends was hard to control unless students purposely moved
away from peers to focus on class. Participants’ study strategies were varied, but all included using the technology required to help study for exams and complete assignments. Their increased motivation may have been a result of being offered the ability to choose their own learning process (Mankin, 2004). Technology added another way for them to learn, giving them options when they needed to study and giving them more choices to choose from (2004).

The faculty helped students engage in deep learning by tapping into the intrinsic motivation using a variety of strategies in the search for understanding (D. Rogers, 2000). Students were expected to bring their own set of experiences to the program, and the faculty helped students identify new content and set it in a context that could be applied in the future. The faculty stressed the product of learning rather than the process and achievement of high grades to students and empowered them to become lifelong learners. By tying stimulating and interesting tasks, activities, and materials, and including variety that was meaningful to the students personally, the faculty were able to tap into students’ interests and increase intrinsic motivation (Pintrich, 2003). Teaching the students to be independent learners was not only helping to hone their job skills but also supporting self-directed learning with the instructor as a guide. Self-efficacy was related to student cognitive engagement and performance. With the training to use the technology provided early on in the program, students felt as though they could not only use the technology, but could also troubleshoot it for themselves before asking for help. Students who believed they could use technology or complete assignments were more likely to actually do so (Pintrich & DeGroot, 1990).

Out of class, students cited numerous reasons why they remained engaged and motivated in the program. Extrinsic motivators such as social time, seeing friends, as well as larger
extrinsic motivators like family members offering encouragement and the degree they would earn, helped keep them on track. Some used a reward system to help self-regulate in order to complete work, while others used technology as a reward. For example, one participant said that, for every hour he studied for a test or worked on an assignment, he would reward himself with checking his cell phone to see if anyone had called or sent him a text message during that time. All of the students who participated cited intrinsic and extrinsic motivators used to help them be successful.

Students identified that they were learning in small increments when they could make a connection to classroom content in a real world setting or when they could teach someone else what they had learned. The faculty provided multiple avenues to deliver content, offering visual representations, talking them through problems and examples, and letting students try for themselves (D. Rogers, 2000). The technology that was integrated added to the learning modalities of students by offering them another way of seeing, hearing, or touching their content. Their comfort and self-efficacy improved through the course and they felt good when they were able to prove they had learned, whether it was by modeling their knowledge to others or a better grade. They treated their time in the program like a job, knowing that in two years, resources and expertise from the faculty would not be available to them at their convenience. Students’ attitudes about their education lent itself to their motivation to learn as much as they could before they graduated. Their personal goals contributed to their ability to self-regulate their learning and helped them monitor and control their own behavior (Pintrich, 2003).

**Recommendations**
Recommendations for Practice

The recommendations that surfaced from this study are grounded in the findings and analysis of results from the data. They are based in the targeted areas for practice and recommendations for future research. The focus lies in the integration of technology, how technology influences student engagement and motivation, and how technology affects classroom instruction.

Recommendations for Scholar©. Through student feedback and analysis of video, it is recommended that the course management tool, Scholar©, be organized by individual faculty to help streamline the site for students. Every faculty had different active options in Scholar© for students and this made it confusing. Students take courses from each of the faculty multiple times in their two years of education, enabling them to get to know their teaching style and their preferences with technology. Faculty should capitalize on this and work to streamline their technological offerings so students will know what to expect when they open Scholar© pages from the same faculty. Students noted that some faculty used one particular aspect of the course management site, but failed to keep it updated while other faculty had their site so overpopulated with resources that it was difficult for students to find the ones they needed to keep up with the course. Student feedback revealed that there was no consistency among the courses taught by each faculty member, making it difficult to find any common organizational pattern and confusing students.

It is recommended that faculty begin utilizing the chat function more in and out of class to engage students who were less likely to answer a question verbally. This helped engage all of the learners through multiple contexts and make students less likely to browse the Internet for
fun during class time. Chat can be used to offer online office hours so students may ask questions at their convenience. This can be implemented regularly or before deadlines were getting close to help faculty reduce the number of emails if they found it benefitted both groups.

The forum or discussion board function may also serve to be a valuable asset to the program. Faculty can ask questions before class to gauge what kind of pre-existing knowledge students possess and to deliver a pre-test to prepare for upcoming material. Forums can be a good place to discuss questions that the majority of the class may have or ask them to think about and discuss topics that are not on the syllabus, but still relevant to the material. Examples could include current events, ethical issues, or trends within the industry that is being studied.

Faculty should encourage students to collaborate using the Wiki feature in Scholar© so students can work together to build a database of questions to ask during class, build a study guide for an upcoming test, or create a list of possible internship sites, and provide feedback from their own experiences. With clear expectations and a moderator to manage content, the Wiki can be built on by each class and be changed or modified over time. This will enable students to find information about the program in one location and keep the faculty up to date on what the students are using for technology outside of their assignments. An interested student can serve as the moderator and help edit content posted by students.

Recommendations for classroom teaching. It is recommended that the faculty work to minimize direct instruction in classes. Students cited boredom with the routine as a main reason they would become unengaged and then lose attention. Students suggested that it would be helpful to have more interaction through group work, example problems, and case studies to work on during class, not just for homework and assignments. The faculty should continue to
view technology as a way to support learning, not a substitute for teaching. Mixing up instruction would help cut down on the number of slides that students had trouble finding and then organizing to study for tests and use in lab assignments.

Using student generated video clips or podcasts may help alleviate boredom and utilize the technology resources to which the students have access. Students can be asked to take what they are applying in laboratory classes or internships, record it with their cell phones or laptop based cameras, and submit the videos as assignments, pieces of laboratory reports, or to teach future classes. This would help students use the skills they learned during their introductory classes and help the faculty to teach future classes or to market the program to future students. Finding creative ways to engage students in their assignments will help them to remain focused during class and to draw more relevant ties from their coursework to future applications.

Offering refresher courses or workshops to students may help students who forget or need additional help using websites or software might be help reduce students’ anxiety about using new software or using it after a stretch of inactivity. Student feedback revealed that sometimes software was used for a few weeks and that students forgot what they had learned and then struggled to use it later. Faculty could offer workshops to returning students that mimic the first day of instruction for incoming freshman, but on a smaller scale and target any new changes that students will see in their upcoming year.

Faculty and student collaboration could be a powerful teaching tool. Students are fortunate to take multiple classes from the same faculty during their two years and this could be emphasized more. Through the use of technology, faculty could facilitate projects or cross disciplinary assignments for students to combine their coursework. This could help students
make connections between classes and, instead of viewing them as separate, begin making connections among classes and how they relate to each other. Faculty could work to co-teach or to provide material for other classes and use other suggestions, such as the Wiki, to help foster collaborative teaching and learning.

Other recommendations. The university website that markets the program was accessed numerous times to glean information and help the researcher get to know the students she would be working with during data collection. After collecting data and working with the program, she has determined that the website does not reflect the program fairly and should be re-evaluated and updated to reflect the course offerings, program description, and the heavy use of technology as a key to the students’ futures so potential students can make more informed decisions on whether or not to apply to and attend the program. This change may help potential donors and alumni stay up-to-date and can be used as a powerful marketing tool for the program.

Recommendations for Further Research

Based on the findings of the interviews, further research is recommended to investigate how program graduates feel about their experiences and what job readiness skills they feel the program helped them learn. With heavy use of technology, research would be valuable in determining if students are using technology at a high level or if technology use declines or increases. This evaluation might also be helpful in determining what kinds of technology the program should focus on in order to meet the needs of the industry the program is serving. Evaluation of technology use should take place regularly to help meet the needs of students and also address the rate of change that technology has in the workplace.
Further research should investigate the faculty and students as two separate groups, to get a more in-depth picture of how each functions separately. This would be beneficial in exploring how each group perceives the other and what role technology plays within the group. Examining the process of implementation and diffusion of a technology may help the program evaluate how they go through the decision making process individually and collectively. Faculty could be investigated as they research new technologies, their approach in adopting them for personal exploration, and how they diffuse their idea to the faculty and student population. What does this look like from the exploration stage to implementation stage?

There needs to be a continued effort to look at the content of the curriculum of the program and how it compares to the technology that is being implemented. Does the faculty design the course first and then go look for technologies to integrate or do they examine the technology first and then design the course around them? This may also be helpful in determining what teaching style the faculty has and where they place their own personal emphasis.

Based off student feedback, further research of the students could help determine if students can multi-task effectively during a class session when a faculty is presenting new material and the student is browsing on their computer. Will students report they are more engaged if they are not browsing on their computer? Will their grades change as a result of not using technology during class? Student feedback revealed that they prefer to have access to technology but also find it distracting during class. Student study habits were also affected by technology and the interviews revealed that students would go someplace where there was no technology available in order to study for tests.
It may also serve the program to study what learning styles the students enrolled have and compare it to the teaching styles of the faculty. If there are major differences in the two groups, it may help the program adapt their teaching style to meet the students’ needs and adjust the way information is presented in class and online. If there are no major differences, it might be helpful for the faculty to evaluate their teaching methods to ensure their students are receiving the highest quality instruction and that the technology being used is being utilized properly.

Additional research should be conducted on a program within a four year university setting to identify similarities and differences within the faculty and the amount of technology the faculty chooses to adopt. The same methodology could be followed within any program to examine technology integration from the faculty and student perspectives. It would be interesting to examine students’ goals in a four year program and how they differ compared to the goals and future plans of students in the Associate’s Degree Program. Comparative case studies would allow the researcher to provide insight to the reaction of each group separately.

While the majority of the graduates return to the industry, the program should evaluate the students who decide to remain in college. Evaluating the students who continue their education may help alter course offerings to help those that want to continue make a smooth transition into a four year university. The program may consider partnering with a four year university to offer blended classes to help ease the transition for those wishing to pursue their four year degree.

As a limitation of a single case study, it lacks the ability to draw comparisons against other cases. For instance, how do other associate degree programs integrate technology and how does that affect student learning in the classroom and after they complete the program?
Questions concerning integration, selection of technology, the decision making process for technology, and how students view technology in the classroom would provide insight into how other institutions react to changing instructional technologies and stay current to help graduates learn the skills they will need for the job market.

Summary

Future careers will require students to discover what they need to know how to do rather than be able to memorize and recall facts (Oblinger, 2005). Society will need college graduates with mental agility and adaptability. Technology can help students become adaptable by providing them with the facts and enabling them to solve problems using technology as a source to find information, to make their job more efficient, or to help them complete a task.

Through effective means of technology integration, this program has been able to facilitate student learning as well as remove barriers to integration through planning, collaborating with peers, preparing lessons and materials, allowing time to explore and practice, and evaluate, develop, and expanding the students and faculty skills on a constant basis (Kershaw, 1996). The faculty has worked to integrate technology that will be necessary and timely to its graduates and has incorporated technology where it was needed, not just for the sake of integrating it. The administrator offered faculty opportunities to learn, improve their skill set, and make informed decisions on whether or not to integrate technology. Leadership from the faculty administrator trickles down to the faculty, who are able to voice their opinions and share ideas, while being supported in implementing technology.

The findings of this study provide an authentic perspective of technology integration from the point of view of the faculty and students in an Associate’s Degree program who have
chosen to immerse faculty and their students in technology as a way to improve student employability skills, make them savvy to changes in the agriculture industry, and help them learn how to think for themselves in a guided environment. Three significant themes emerged from the data:

- Technology integration begins with open dialogue and buy-in from the entire faculty.
- Technology integration is supported by the faculty administrator and is integrated through workshops and training to help the entire faculty get comfortable with any new technology.
- Technology is supported if there is a clear benefit to the students.

Students have responded positively to the integration of technology and see it as a benefit for their future careers. They feel that the faculty offers them an edge that they would not get anywhere else and that the Associate’s Degree from the program is a valuable tool when interviewing for jobs. The technology they are asked to purchase and integrate is required with a purpose, and they view it as another way for them to be more competitive in their future while learning as much as possible from the faculty while they are enrolled. With almost no attrition due to drop-outs or poor grades, these students are focused and view the pursuit of the degree as their job for two years. They are motivated by not only grades, but more importantly, by the goals that they have set for themselves. Technology is incorporated seamlessly and students are immersed in its use from day one, with the faculty serving as their support system while they learn how to use it efficiently. The technology is viewed, not as an alternative to an instructor, but as another way to communicate information and save time, so that more class time can be dedicated to teaching instead of collecting assignments.
Technology helps students learn by offering another way to gather and organize information using the Internet and the course management system, Scholar©. The use of technology gives flexibility to both the faculty and the students so they can communicate, organize using online calendars, and chat through Scholar© if students need help and they are not in close proximity to the faculty. The relationship that the faculty and students have with technology is paramount, and both sides agree that it would be counterproductive to stop using it as they see the benefits of using it.

Technology integration is being carried out successfully in this Associate’s Degree program. Faculty are learning how to adopt it at their own pace while maintaining high instructional standards for the students who come to the program expecting a high quality education that will give them the necessary skill set to enter the agriculture industry. As new technology becomes available in the field of education, this program should continue to find the benefits to the students and make informed decisions on how to best adopt technologies.

Further research and studies were suggested in order to continue to compare the current students with the graduates and their view on technology in the classroom post-graduation. More research could be conducted after separating the faculty and the students into two separate groups. It is proposed that one piece of technology be studied in depth, not technology as a whole throughout the program. In closing, similar research should be conducted on a four year program to gain more insight on technology integration in that educational setting.
Appendix A

IRB Approval Letter

MEMORANDUM

DATE: February 16, 2011

TO: Rick Rudd, Tiffany Drape, Donna Moore, Samuel Doak, Pavli Mykerezi, Joseph Guthrie

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires October 26, 2013)

PROTOCOL TITLE: Technology Integration in Higher Education: A Qualitative Case Study

IRB NUMBER: 10-1084

Effective February 16, 2011, the Virginia Tech IRB Chair, Dr. David M. Moore, approved the amendment request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at http://www.irb.vt.edu/pages/responsibilities.htm (please review before the commencement of your research).

PROTOCOL INFORMATION:
Approved as: Expedited, under 45 CFR 46.110 category(ies) 6, 7
Protocol Approval Date: 1/21/2011
Protocol Expiration Date: 1/20/2012
Continuing Review Due Date*: 1/8/2012

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:
Per federal regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals / work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.
Appendix B

Participant Consent Form

Virginia Polytechnic Institute and State University

Informed Consent for Participants in Research Projects Involving Human Subjects

**Project Title:** Technology Integration in Higher Education: A Qualitative Case Study

**Investigators:** Ms. Tiffany Drape, Graduate Research Assistant, Virginia Tech
Dr. Donna Moore, Professor, Virginia Tech
Samuel Doak, Professor, Virginia Tech
Joseph Guthrie, Professor, Virginia Tech
Pavl Mykerezi, Director, Virginia Tech

I. Purpose of Research

The overall purpose of this study is to begin exploring technology integration and how it might influence student learning. This research will help instructors as they plan their courses and class sessions. With a greater understanding of what influences student learning, instructors will be able to create student-centered courses that promote learning for their students.

II. Procedures

This study is restricted to individuals 18 years of age or older. Should you agree to participate in this study, procedures include:

1. Recruit volunteers from AT 0414, Soils and Nutrient Management and AT 0274, Agribusiness Marketing and Entrepreneurship.
2. Participants will read and sign informed consent forms.
3. Prior to data collection, you will complete a brief demographic form.
4. Prior to your interview, you will complete the GEFT, a learning style assessment.
5. You will be video recorded during class using stand alone cameras during class, two times per week. Recording will last approximately six weeks.

III. Risks

This study has been reviewed and approved by the Virginia Tech Institutional Review Board. Individual answers and identities of the participants will be protected at all times. This research involves no more than minimal risk.

IV. Benefits

By participating in this study, you will be able to explain how technology might influence your learning. No promise or guarantee of benefits has been made to encourage you to participate. You may contact the researchers at a later time for a summary of the research results if you wish.

V. Extent of Anonymity and Confidentiality

Protecting your identity is a top priority of this study. By participating in this research project, your information will be kept strictly confidential. At no time will information be released that allows an individual to be identified. At no time will the researchers release the results of the study to anyone other than individuals working on the project without your written consent. Only the research team listed above will have access to your data.

It is possible that the Institutional Review Board (IRB) may view this study’s collected data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.

VI. Compensation

Virginia Tech Institutional Review Board: Project No. 10-1094
Approved February 16, 2011 to January 20, 2012
There will be no compensation.

VII. Freedom to withdraw
You are free to withdraw from the study at any time without penalty. You are free not to answer any questions without penalty.

VIII. Subject’s responsibilities
I voluntarily agree to participate in this study. I have the following responsibilities:
- Complete a demographics form
- Complete the GEFT, a learning style assessment
- Be video recorded during class

IX. Subject’s Permission
I have read and understand the Informed Consent and the conditions of this project, and I am above the age of 18 years old. I have had all of my questions answered. I hereby acknowledge the above and give my voluntary consent:

______ YES  _______ NO

Participant Signature: ______________________ Date: __________________

Should I have pertinent questions about this research, I may contact:

Ms. Tiffany Drape
tdrape@vt.edu
540.231.6836

Dr. Donna Moore
mooredm@vt.edu
540.231.6836

Samuel Doak
sdoak@vt.edu
(540) 250-6903

Joseph Guthrie
joegu3@vt.edu
(540) 231-3395

Pavl Mykerezi
pmykerezi@vt.edu
(540) 231-7649
Appendix C

Program Administrator Consent

Virginia Polytechnic Institute and State University

Informed Consent for Participants in Research Projects Involving Human Subjects

**Project Title:** Technology Integration in Higher Education: A Qualitative Case Study

**Investigators:**
- Ms. Tiffany Drape, Graduate Research Assistant, Virginia Tech
- Dr. Donna Moore, Professor, Virginia Tech
- Samuel Doak, Professor, Virginia Tech
- Joseph Guthrie, Professor, Virginia Tech
- Pavli Mykerezi, Director, Virginia Tech

I. Purpose of Research

The overall purpose of this study is to begin exploring technology integration and how it might influence student learning. This research will help instructors as they plan their courses and class sessions. With a greater understanding of what influences student learning, instructors will be able to create student-centered courses that promote learning for their students.

II. Procedures

Your participation in the above mentioned interviews will involve sharing with the interviewer your experiences as director of the Agriculture Technology Program. The interview will last between 60-90 minutes at will take place at a location of your convenience. You may withdraw at any time.

III. Risks

This study has been reviewed and approved by the Virginia Tech Institutional Review Board. Individual answers and identities of the participants will be protected at all times. This research involves no more than minimal risk.

IV. Benefits

By participating in this study, you will be able to explain how technology might influence your learning. No promise or guarantee of benefits has been made to encourage you to participate. You may contact the researchers at a later time for a summary of the research results if you wish.

V.Extent of Anonymity and Confidentiality

Protecting your identity is a top priority of this study. By participating in this research project, your information will be kept strictly confidential. At no time will information be released that allows an individual to be identified. At no time will the researchers release the results of the study to anyone other than individuals working on the project without your written consent. Only the research team listed above will have access to your data.

It is possible that the Institutional Review Board (IRB) may view this study’s collected data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.

VI. Compensation

There will be no compensation.

VII. Freedom to withdraw

You are free to withdraw from the study at any time without penalty. You are free not to answer any questions without penalty.

Virginia Tech Institutional Review Board: Project No. 10.1084
Approved February 16, 2011 to January 20, 2012
VIII. **Subject’s responsibilities**
I voluntarily agree to participate in this study. I have the following responsibilities:
Complete one interview lasting no more than 90 minutes.

IX. **Subject’s Permission**
I have read and understand the Informed Consent and the conditions of this project, and I am above the age of 18 years old. I have had all of my questions answered. I hereby acknowledge the above and give my voluntary consent:

______ YES    ______ NO

Participant Signature    Date

Should I have pertinent questions about this research, I may contact:

Ms. Tiffany Drape  
tdrape@vt.edu  
540.231.6836

Dr. Donna Moore  
mooredm@vt.edu  
540.231.6836

Samuel Doak  
svdoak@vt.edu  
(540) 250-6903

Joseph Guthrie  
joegu3@vt.edu  
(540) 231-3395

Pavli Mykerezi  
pmykerezi@vt.edu  
(540) 231-7649
Appendix D

Instructor Consent Form

Virginia Polytechnic Institute and State University

Informed Consent for Participants in Research Projects Involving Human Subjects

Project Title: Technology Integration in Higher Education: A Qualitative Case Study

Investigators: Ms. Tiffany Drape, Graduate Research Assistant, Virginia Tech
Dr. Donna Moore, Professor, Virginia Tech
Samuel Donk, Professor, Virginia Tech
Joseph Guthrie, Professor, Virginia Tech
Pavlí Mykerézi, Director, Virginia Tech

I. Purpose of Research
The overall purpose of this study is to begin exploring technology integration and how it might influence student learning. This research will help instructors as they plan their courses and class sessions. With a greater understanding of what influences student learning, instructors will be able to create student-centered courses that promote learning for their students.

II. Procedures
Your participation in the above mentioned interviews will involve sharing with the interviewer your experiences as a faculty in the Agriculture Technology Program. Each interview will as 30-45 minutes at will take place at a location of your convenience. You may withdraw at any time.

III. Risks
This study has been reviewed and approved by the Virginia Tech Institutional Review Board. Individual answers and identities of the participants will be protected at all times. Qualitative interviews will be conducted and transcribed by Tiffany Drape. Student interviews will have all identifying names removed and generalized in the qualitative interviews. Video will only be analyzed by Tiffany Drape for the purpose of observing classroom interactions and course material. This research involves no more than minimal risk.

IV. Benefits
By participating in this study, you will be able to explain how technology might influence your learning. No promise or guarantee of benefits has been made to encourage you to participate. You may contact the researchers at a later time for a summary of the research results if you wish.

V. Extent of Anonymity and Confidentiality
Protecting your identity is a top priority of this study. By participating in this research project, your information will be kept strictly confidential. At no time will information be released that allows an individual to be identified. At no time will the researchers release the results of the study to anyone other than individuals working on the project without your written consent. Only the research team listed above will have access to your data.

It is possible that the Institutional Review Board (IRB) may view this study’s collected data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.

VI. Compensation
There will be no compensation.

VII. Freedom to withdraw
Virginia Tech Institutional Review Board; Project No. 10-1084
Approved February 16, 2011 to January 30, 2012
You are free to withdraw from the study at any time without penalty. You are free not to answer any questions without penalty.

VIII. Subject’s responsibilities
I voluntarily agree to participate in this study. I have the following responsibilities:
- Complete three or four interviews lasting 30-45 minutes a piece.

IX. Subject’s Permission
I have read and understand the Informed Consent and the conditions of this project, and I am above the age of 18 years old. I have had all of my questions answered. I hereby acknowledge the above and give my voluntary consent:

_____ YES

_____ NO

Participant Signature ________________________________ Date ________________

Should I have pertinent questions about this research, I may contact:

Ms. Tiffany Drape
tdrape@vt.edu
540.231.6836

Dr. Donna Moore
mooreedm@vt.edu
540.231.6836

Samuel Doak
sdoak@vt.edu
(540) 250-6903

Joseph Guthrie
joguth@vt.edu
(540) 231-3395

Pavli Mykerezi
pmykerezi@vt.edu
(540) 231-7649
Appendix E

Observation Guide

The purpose of observations is to learn how an instructor engages students with technology and how students engagement and motivation

During class, the following constructs will be used to guide the researchers’ observations.

How does the instructor keep students engaged and motivated using technology?
   a. What technology does the faculty use in the classroom?
   b. How does he engage students to begin class?
   c. Does the faculty offer support or help for students who are having trouble using the technology?
   d. What solutions does he offer?
   e. What behaviors does he exhibit when he’s teaching with technology?
   f. What is the nature of the learning environment?
   g. When the professor is interacting with students, does he refer to technology?

What are the students doing while the instructor is teaching the class?
   a. How do students engage in the classroom learning process using technology?
   b. How are students using technology and what effect is it having on their engagement and motivation?
c. What kind of response do students exhibit when the professor refers to an upcoming assessment or assignment?

d. What kinds of questions are students asking in class? (Something related to recall of information vs. mastery?)

e. What do students do when technology is used during the class?

f. What non-verbal or verbal cues do students use when the teacher discusses technology (related to a Scholar site if there is one)?

g. What do students do when technology is not used during the class?

h. What cues does the professor use to motivate students? (Language related to grades, learning, etc.)

i. What cues are students giving that demonstrate they are learning?
Appendix F

Interview Guide

First Interview-Before classes begin

Instructor Interview Guide

How long have you been using this technology?

What has changed?

How do you/your dept make decisions regarding technology use?

What considerations weigh the heaviest or least?

What feedback do you get from students regarding these choices?

Whom do you ask for mentoring/help with a new piece of technology?

How much time do you spend learning new technologies?

How does this program make decisions on implementation?

Describe your definition of technology.

Describe your definition of technology integration.

How do you decide what technologies to integrate when you’re designing your class?

How comfortable are you with the technologies you integrate?

Whom do you ask for help when you’re struggling with the technologies you use in your classes?

Where do you go to view new technologies you might want to use in your field?

How would you define learning?
Do you view the technology you integrate as a tool to help your learning and understanding of the material? How?

First Interview

Student Interview Guide

Describe your definition of technology.

How does this professor integrate technology?

Based on the above answer, do you feel as though the technology helps or hinders the delivery of the course content and why?

Do you find it helpful in learning course content? Why or why not?

What factors help you stay engaged and motivated in this class?

Whom do you ask when you need help with technology?

How would you define learning?

Do you view the technology the professor integrates as a tool to help your learning and understanding of the material? How?

Why do you think the professor chooses to integrate this technology?

Are there other technologies or other ways of using this technology that you think the professor should be using or doing? Why or why not?

What do you think the professor’s objectives are for this course?
Questions for Program Director

Can you tell me some of the history of the program and how it evolved into what it is today?

How do you/your dept make decisions regarding technology use?

What considerations weigh the heaviest or least?

What feedback do you get from faculty and students regarding these choices?

Who does faculty ask for mentoring/help with a new piece of technology?

How much time do you offer faculty for learning new technologies?

How does this program make decisions on implementation of new technology?

Describe your definition of technology.

Describe your definition of technology integration.

Describe the process a faculty would go through to get funding or support for new technology.

Where do you go to view new technologies you might want to use in this program?

How would you define learning?

Do you view the technology you integrate as a tool to help your learning and understanding of the material? How?

Second and Third Interview

Instructor Interview Guide

How do you think this course is progressing?
What do you see as the strengths of this course?

What do you see as areas that need to be improved?

What aspects of the technology do you think are going smoothly?

Which areas of the technology do you think need to be refined?

How comfortable are you with the technology you’re using right now?

How are you gauging student’s engagement during class?

What strategies do you implement to encourage student engagement and motivation for the course if you notice them faltering?

Second Interview

Student Interview Guide

How do you think this course is progressing?

What do you see as the strengths of this course?

What do you see as areas that need to be improved?

What aspects of the technology do you think are going smoothly?

Which areas of the technology do you think need to be refined?

How comfortable are you with the technology you’re using right now?

How would you define your engagement in this class?

What keeps you motivated in this class?

What strategies do you use to study for this class?
A fourth interview can be administered if necessary and saturation has not occurred.
REFERENCES


